AGENCY FOR INTERNATIONAL DEVELOPMENT
PPC/CDIE/DI REPORT PROCESSING FORM

PN-ABH-219

ENTER INFORMATION ONLY IF NOT INCLUDED ON COVER OR TITLE PAGE OF DOCUMENT

1. Project/Subproject Number
936-5447

2. Contract/Grant Number
DHR 5447-Z-00-7074

3. Publication Date
January 1991

4. Document Title/Translated Title
A Case Study of Successful Innovations in Thailand's Fresh Fruit and Vegetable Export Industry

5. Author(s)
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6. Contributing Organization(s)
AgriSource Co. Ltd
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Agricultural Marketing Improvement Strategies Project (AMIS)

7. Pagination
75 pages

8. Report Number

9. Sponsoring A.I.D. Office
S&T/RD

10. Abstract (optional - 250 word limit)

11. Subject Keywords (optional)
1. Fresh fruit and vegetable exports
2. Agribusiness
3. horticultural marketing
4. Thailand
5. Export promotion
6. AMIS

12. Supplementary Notes

13. Submitting Official
Jerry Martin

14. Telephone Number
(301) 913-0500

15. Today's Date
March 7, 1991

DO NOT write below this line

16. DOCID

17. Document Disposition
DOCRD [] INV [] DUPLICATE []

AID 590-7 (10/88)

PN-ABH-219
ISN 70179

A Case Study of Successful Innovations in Thailand's Fresh Fruit and Vegetable Export Industry

January 1991

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A Case Study

of

Successful Innovations in

Thailand's Fresh Fruit and Vegetable Export Industry

Prepared by

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for

The Postharvest Institute for Perishables
University of Idaho

and

Agricultural Marketing Improvements Strategies Project

January 1991

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ABBREVIATIONS

ATT	Agricultural Technology Transfer
BAAC	Bank of Agriculture and Agricultural Cooperatives
CS	Cold Storage
DMI	Don Muang International Airport
DOA	Department of Agriculture
DOAE	Department of Agricultural Extension
DEP	Department of Export Promotion
EAC	East Asiatic Company
EMD	Export Marketing Development Division (United Kingdom)
FAO	Food and Agricultural Organization
FFV	Fresh fruits and vegetables
HRI	Horticulture Research Institute
IMP	Interministry Project
MOAC	Ministry of Agriculture and Cooperatives
MOC	Ministry of Commerce
MOCT	Ministry of Communications and Transportation
MOSTE	Ministry of Science, Technology and Energy
NESDB	National Economic and Social Development Board
PIP	Postharvest Institute for Perishables
PPMD	Plant Pathology and Microbiology Division
QC	Quality Control
RSC	Research Service Center
TBZ	Thiobenzol
THAI	Thai Airways International
TISTR	Thailand Institute for Scientific and Technological Research
TPC	Thai Packaging Center
USAID	United States Agency for International Development
VHT	Vapor Heat Treatment
VOCA	Volunteers in Overseas Cooperative Assistance

ACKNOWLEDGEMENTS

This study is one of a series of case studies commissioned by the Agriculture Marketing Improvement Strategies (AMIS) project to document innovations in agricultural marketing systems. It deals specifically with the combinations of successful policies and public/private sector interactions which have helped increase exports of Thai fresh fruits and vegetables. Both the historical development of the industry and the policies and organizations crucial to its growth were of particular interest. In addition, special attention was given technology transfer, financing and research, and quality control.

The broad scope and time span of this study required the resources of long-time participants in the Thai fresh fruit and vegetable industry. Several people offered valuable background information that would have been more difficult to obtain from other sources. Mrs. Dara Buangsuwan of the DOA, Mrs. Sing Ching Tong Dee of TISTR, and Dr. Robert Ralston of the Ministry of Agriculture deserve special note for their contributions not only to this report, but also to improvements to the industry. Ken Fry contributed much to the completion of this report. His sincere efforts deserve special thanks. Kritsanapong Luksanapokin also offered a valuable Thai perspective to the project and assisted in researching and completing the report.

While research for the report was conducted mainly in Bangkok, the team visited and interviewed producers and shippers in the northern and central regions of Thailand.

Special thanks are due to Tom Dechert and Harvey Neese at PIP for their patience and guidance as this project was completed and to Richard Abbott and John Holtzman of the AMIS staff for their comments and suggestions.

Finally, thanks are due to everyone who was interviewed and who contributed so much to this report. As with any study with such a broad scope of work, it is impossible to include all points of view, however important they may be. The authors regret and assume responsibility for any errors, omissions, or misinterpretations. We sincerely hope these efforts to examine an important part of the Thai economy will be useful to all who are interested.

EXECUTIVE SUMMARY

The objective of this study was to document the combinations of successful policies and public/private sector interactions which have helped increase exports of Thai fresh fruits and vegetables. Of particular interest were the historical development of the industry, as well as policies and organizations crucial to its growth. Emphasis was also given to technology transfer, financing, training and research, and quality control.

Thai farmers have traditionally produced fresh fruits and vegetables (FFV) primarily for home consumption and domestic markets. The produce, which varied widely in quality, was put together in market baskets for sorting at the market or by the consumer. As foreign demand developed, the focus gradually changed to encourage farmers and shippers to sort the produce by grade for export sales. Numerous market players, including many local and provincial middlemen and brokers, have traditionally been part of this system. However, with increasing interest in exports and more foreign investment, the system has become more streamlined and efficient. Exporters, often with government support, are establishing closer links to producer groups through contracts. Improvements in technology transfer and market information have resulted from these efforts.

The Thai Government, through its national policies and the objectives of individual agencies, has developed market oriented policies to encourage the public and private sectors to cooperate in expanding exports.

Although the production volume of most FFV has not increased appreciably in the past decade, exports have increased markedly. In the late 1980s, total FFV exports reached nearly 100,000 tons and contributed about 1,000 million Baht ($40 million) to Thailand's export earnings. By comparison, exports totaled about 60,000 tons worth roughly 750 million Baht ($30 million) in the early 1980s.

Numerous public and private sector organizations have cooperated to develop the industry. The key agencies within the Thai government include the Ministry of Agriculture's Department of Agriculture (DOA) and Department of Agricultural Extension (DOAE); the Department of Export Promotion (DEP) in the Ministry of Commerce; the Thai Institute of Scientific and Technological Research (TISTR); and Thai Airways International (THAI). Many private sector firms have also contributed to the growth of the industry.

Training and research within the industry have been stimulated mostly by DOA, DOAE, TISTR, and private firms. They are often supported by international aid agencies such as AID, JICA, and others. Research has centered on fruit fly control and postharvest improvements of quality, as well as production and varietal improvement research. The Interministry Project has been an important catalyst in developing priorities and assigning research objectives to various government agencies.

Production of FFV in Thailand's small farmer-based system has been supported by DOAE offices in the 73 provinces and DOA and TISTR research

results. Traditional methods of production are not easily changed to supply the types of quality horticultural produce required by export markets. However, with exporters establishing closer links to producer groups and larger farms being established for export production, new methods are gradually being introduced.

DOAE, DOA, TISTR, and private firms have devoted considerable resources to packing and processing development. TISTR's Packaging Center and Research Service Center have been leaders in working with the private sector to improve packing methods and materials.

Quality control measures have been more difficult to implement due to the traditional practices of the Thai FFV industry and the wide range of quality demanded by foreign buyers. The DOA, to better serve the needs of exporters, has established numerous export inspection centers throughout the country. These centers help to streamline the flow of products to the market. The establishment of one of these centers at the international airport in Bangkok in 1987 was a major improvement. Development of more cold storage facilities there to serve smaller exporters is proceeding more slowly. The Horticultural Research Institute has established grades and standards, but they have not been widely accepted by the industry. Traditional marketing practices and many diverse export market requirements make it difficult to design acceptable standards.

Nearly every form of ground transportation, as well as airfreight and seafreight, serve the export industry. Truck transport along the Malaysian peninsula and seafreight by refrigerated containers are the most common modes of transportation to Asian markets. Seafreight has strong potential for development and considerable research has been underway by DOA to make this mode of transport more viable. Trial shipments have been made to several European destinations with encouraging results. Low airfreight rates, which are regulated by the Government and supported by Thai Airways' policy to make at least 50 percent of its cargo space available to perishables, have been a major influence on increased exports.

Market development and promotional activities, implemented by DEP and other government agencies in cooperation with private firms, have also been effective in expanding exports. These efforts have included market research, trade missions and shows, in-store promotions, training, and media promotions in a variety of domestic and foreign venues.

Key interactions may be summarized as follows:

- Through the efforts of market-oriented, realistic policy and planning, government agencies have worked to serve the private sector. TISTR's Packaging Center and Research Service Center and DEP's international promotional efforts are excellent examples. The services offered by these agencies have proven to be most effective.

- The Interministry Project in the Ministry of Agriculture formed direct lines of communications and cooperation between MOAC

departments and other government agencies involved in FFV exports. The cooperative research that resulted has directly benefitted the industry.

- Thai Airways FFV air cargo policy, in tandem with Thai government freight rate regulations on FFV, has kept airfreight rates low and has generally ensured that shippers have export transportation available.

Lessons learned:

• Cooperation between various departments within the Ministry of Agriculture, TISTR, and other government agencies under the Interministry Project has had a positive impact on training and research. Private companies and farmers have gained by accessing higher quality research and training resources than they would have been able to support on their own. Through these interactions, the government agencies have gained better insights into the needs of the industry and have adjusted their research and training to meet these needs. Despite the many positive interactions noted, competition is more common than cooperation among government agencies.

• Increased investments by exporters, which are often facilitated by government agencies, are important elements in upgrading the FFV industry. This underlies a more important lesson, which is that the private sector has been an effective agent of change throughout the production and marketing system. Changes have been most effective when government agencies have facilitated these investments. DOAE and BAAC efforts to support farmer groups that are working with exporters are good examples.

The Royal Project offers lessons regarding the impacts of a highly visible national project on several segments of the FFV industry. The objectives of the project are to eliminate opium production and offer alternative crops to farmers. The project has certainly been successful in this respect, and FFV production has increased considerably. Because the project is so visible due to the Royal sponsorship, there have been other benefits in the form of more research efforts, greater investments in packing and transportation methods, and promotions in tourist sites and major hotels in Bangkok.

• The case of mango shipments to Japan offers additional lessons in transforming a product so it meets the needs of the market. The first lesson is that direct contact between local suppliers and end users is essential. The efforts of an influential producer, with the help of Thai and Japanese officials, to make contacts with Japanese buyers was the first step in developing this market. The relationships that developed from this step encouraged the Japanese to look more closely at the Thai mango industry and provide the needed VHT equipment for fruit fly control.

• Another lesson to be learned from observing the industry in its present state, which is less obvious but just as important, is that

relatively simple, low-cost technology and efforts may be enough to cause marked improvements in quality.

• Inspection facilities must be in sufficient numbers and appropriate locations to serve the needs of the shippers and buyers, not the government agencies that operate the facilities. The transfer of the Bangkhen inspection facility to the airport, at the urging of exporters, was a relatively simple and low-cost effort by the Government to better serve the private sector exporters who do not have their own cold storage facilities.

• The key lesson in HRI's and others' efforts to establish grades and standards is that it is extremely difficult to transform a system which is based on traditional marketing practices and concepts of quality. Even in most domestic markets today, Thai sellers and buyers accept that a given lot of produce will contain a range of quality. Efforts to establish grades and standards must be implemented gradually and allow for the improvement of quality as the industry evolves.

• Actions by the government to influence airfreight rates have had a positive impact on exports. In fact, without this influence, the industry would probably not exist as it does today. Questions remain, however, concerning the effects of these measures on development of alternative modes of transport, such as seafreight, and the long-term impacts on the FFV industry.

Efforts to develop seafreight methods hold promise, particularly in the large and less quality-demanding "back yard" markets of Asia (lower-income regional markets).

• DEP's efforts to promote Thai FFV internationally have been a key element in building exports. In looking at DEP's programs, some important lessons emerge. The first is that a comprehensive range of activities is necessary for a government agency such as DEP to support the export business. Clear objectives on the types of products to be promoted and the markets to be targeted can be set only through careful research. Often, outside support is needed to do this research. Actual promotional activities target specific markets, but cooperation with diverse groups is usually needed if they are to be effective. Promotions in Europe or North America were not as cost effective as further efforts to develop Asian markets.

Chapters 10 and 11 look to the future of the industry and the opportunities and constraints it faces. Thailand's FFV exports are likely to continue to increase. Shipments of some commodities are likely to expand dramatically. A booming Thai economy, led by heavy foreign investment, is giving the industry more access to capital, technology, and transportation options and is allowing it to meet increasing foreign demand. Constraints to further expansion exist mainly in production of the quality demanded by the market, alleviation of transportation and handling bottlenecks, adherence to quality regulations in foreign markets, and expansion of the still limited cooperation between members of the industry.

Addressing each of these constraints, as well as putting greater effort into the improvement of transportation methods and the preservation of quality, particularly between the farm and point of export shipment, is suggested. Additional attention to regional markets is also recommended.

1. BACKGROUND OF THE INDUSTRY

1.1 History

Thai farmers have traditionally produced fruits and vegetables primarily for home consumption and domestic markets. Relatively small volumes were exported, mainly by specialized local Thai-Chinese companies to established and trusted buyers in the region. Generally, exports consisted of the surplus remaining after domestic needs were satisfied.

Traditionally, produce of all grades was grouped together in market baskets and sold by farmers to middlemen or wholesalers to be sorted out at the market by the retailer or the buyer. With increased demand for high quality products for export, more attention is now given to sorting top quality products often at the farm or in a local packing shed.

New methods have also been implemented throughout the production and marketing channels to preserve more top quality produce. This reorientation toward product quality for specific markets at all levels of the industry is perhaps the key reason for the growth of Thai fresh fruit and vegetable (FFV) exports over the past decade. This impressive record is attributable to efforts by both the public and the private sector to make product improvements and structural changes in the industry. As a result, Thailand's FFV markets are expanding rapidly in Hong Kong, Singapore, Malaysia, and the Middle East, with newer markets opening in Japan, Europe, Canada, and the United States.

Asian markets, particularly in Hong Kong, Singapore, and Malaysia, are traditional outlets for Thai FFV and still absorb the major share of exports. Other markets offer great potential but have been more difficult to access for a variety of reasons. Some of the obstacles encountered in expanding exports of FFV to Europe, America, and Australia were:

- Consumer sensitivity about product quality;
- Limited air cargo capacity;
- High cost of air freight;
- Seafreight limitations; and
- Import trade policies.

Many of these obstacles have gradually been overcome through persistent efforts by private firms to promote and develop new market opportunities. The result has been a broader market base and a steady increase in exports.

1.2 National Policies

Government planning has provided a well-defined policy environment for FFV export development. The National Economic and Social Development Board

(NESDB), comprising representatives from all ministries, develops national policy and reports directly to the Prime Minister. NESDB develops five-year plans in which national social and economic welfare are a primary concern. Once policy is developed by NESDB and approved by the Prime Minister, it is directed to the ministries for implementation.

Since the First National Economic and Social Development Plan of 1961-1966, the focus in agriculture has been on main and feeder roads linking production and marketing systems. Expansion of farm credit has also been important. More recent policies and plans have focused on farm production diversification, promotion of exports, and agro-industrial promotion.

The goals established by the Fifth NESDB Plan (1982-86) included the promotion of an integrated agricultural system with coordination between the public sector and the private sector. Emphasis was also placed on expanding area and improving productivity and product quality.

Agricultural policies established by the Sixth National Economic and Social Development Plan for the period 1987-1991 aimed at improving the social and economic conditions of the agricultural sector. In accordance with this policy, fresh fruit and vegetable exports were actively promoted through research on improved varieties, improved storage facilities, and development of pre- and postharvest technology to meet the quality standards of foreign markets.

In summary, Thailand's policy planning appears to have developed in a logical and systematic manner. Recent policies, particularly the Sixth Plan for Agriculture, have targeted export development in particular as a policy objective. These planning efforts have had a positive impact on FFV exports.

1.3 Industry Performance

1.3.1 Production

Exhibits 1 and 2 show production of selected FFV since 1980. Reliability and accuracy of production data is questionable due to the difficulty in countrywide sampling. Consequently, these figures should be considered only as a guide. The data may be useful in examining production trends, however.

Assuming the trends are accurate, FFV production and area has not increased much over the past decade. Only longan, lichee, and rambutan production increased significantly. Orange, sugar apple, and mangosteen production have also shown good growth. Lichee showed the largest jump in production, with area and production tripling over the period. Longan and rambutan production also increased, but production growth was erratic.

Exhibit 1

Fruits and Vegetables Planting Area (rai)

Year	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Mango	705,653	724,598	700,142	688,596	651,529	703,754	729,174	775,339
Orange	218,802	233,715	212,431	173,217	228,166	234,590	NA	230,857
Pomelos	64,256	63,371	60,088	48,215	50,123	61,036	60,401	67,048
Longans	65,312	67,495	66,551	61,668	70,413	80,207	92,657	109,069
Lichees	13,170	17,180	18,427	19,703	20,193	28,551	31,575	32,446
Rambutan	291,101	283,563	290,851	305,197	313,781	330,091	NA	364,579
Durians	237,533	253,849	270,843	266,797	284,181	338,950	344,440	365,367
Sugar Apples	182,456	246,707	204,733	235,102	207,712	211,559	212,921	258,262
Mangosteen +Quava	137,098	154,711	152,322	126,893	141,570	151,153	NA	152,718
Watermelon	270,516	312,598	399,634	184,319	170,771	170,838	NA	NA
Tomatoes	63,150	58,682	51,487	54,273	49,758	51,976	46,775	NA
Onions & Garlic	407,771	313,681	413,623	409,330	339,687	305,460	326,538	NA

NA = Not Available
Source: Department of Agricultural Extension, Ministry of Agriculture & Co-operatives

EXHIBIT 2

Fruit and Vegetable Production (MT)

Year	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Mango	488,515	517,348	388,131	343,568	336,269	372,510	386,589	422,237
Orange	402,253	500,012	399,169	285,069	500,601	537,982	NA	569,182
Pomelos	74,225	70,230	64,378	44,335	34,894	56,476	55,710	67,275
Longans	19,850	21,206	30,213	29,918	34,040	43,126	20,118	58,661
Lichees	6,128	7,982	9,160	6,692	9,745	11,807	14,221	18,660
Rambutan	392,200	432,989	402,512	429,846	468,579	478,398	NA	448,542
Durian	577,023	278,146	246,780	238,724	335,456	401,378	426,244	444,504
Sugar Apples	187,040	183,421	151,854	222,296	203,450	221,422	188,904	221,536
Mangosteen + Quava	94,241	120,887	112,459	86,123	91,933	100,436	NA	121,615
Tomatoes	94,968	68,154	70,193	96,295	61,893	93,986	74,527	NA
Onions & Garlic	603,892	387,940	583,994	549,477	518,272	559,200	590,337	NA

NA = Not Available
Source: Department of Agricultural Extension, Ministry of Agriculture & Co-operatives

1.3.2 Exports

Exhibits 3, 4, 5 and 6 show Thailand's exports over the past decade for selected FFV. The bar charts in Exhibits 5 and 6 best show the growth in export volume and value. Annual growth in fruit exports has been somewhat erratic, and some commodities have been more popular in foreign markets than others, but the trend generally has been upward. Growth in vegetable exports has stagnated since 1983, but export volumes are well ahead of those in the 1980-82 period. As can be seen from Exhibits 3 and 4, a broad range of products have been marketed internationally.

In the late 1980s, total FFV exports reached nearly 75,000 tons and contributed about 1,000 million Baht ($40 million) to Thailand's export earnings. By comparison, exports totaled about 40,000 tons worth approximately 750 million Baht ($30 million) at the beginning of the decade.

Of the FFV studied for this report, longan, durian, onion, and garlic, pomelo, and mango exports are currently the leading contributors to export value. In 1988, export value of these five commodities was 522 million Baht ($20.9 million), or about 69 percent of the 755 million Baht ($30.2 million) of the total value of the study's commodities in that year.

In 1980, the mix of the top five FFV export commodities in the study was similar. Longan, durian, mango, pomelo, and papaya were the leading export value crops. Total exports of all studied commodities in 1980 was 205 million Baht ($8.2 million), only 27 percent of the 1988 export value. The five leading commodities totaled 182.5 million Baht ($7.3 million), or about 89 percent of exports that year. Growth in export quantities was most marked for onion, garlic, pomelo, durian, and mango.

This analysis suggests that Thailand has made good progress in increasing total export revenues from FFV. Efforts to diversify the product mix and reduce the reliance on only a few crops have been less successful, however.

1.4 Marketing

Marketing of FFV combines a wide range of market players and a complex system of marketing stages. Middlemen, including wholesalers, retailers, and brokers at the local and national level, play important roles in bringing the product from the producer to export locations or domestic consumers. These market players are active in nearly all the intermediary marketing stages of collection and shipping, packing and processing, wholesaling, retailing. The path and speed of movement of FFV through these middlemen and market stages is determined by an equally complex mix of variables, including location and season of production, market knowledge, and income level of the producer, quality of the crop, available transportation, etc.

EXHIBIT 3

Export Quantity of Selected Thai Fresh Fruits and Vegetables
(in tons)

Fruits and Vegetables	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 (Jan - Sept)
Mango	3,275	3,063	4,118	2,538	3,715	8,311	9,400	3,736	6,713	4,192
Orange	1,408	1,226	4,276	4,360	4,031	5,816	4,536	4,318	5,826	679
Pomelo	2,229	2,033	2,763	2,657	2,780	4,505	5,202	6,901	6,150	6,441
Longan	3,684	5,517	10.346	3,369	8,802	4,942	10,612	2,860	12,442	3,205
Lichee	-	-	-	-	559	184	428	1,460	776	744
Rambutan	116	413	523	273	341	1,169	1,865	2,027	1,726	599
Durian	3,516	4,361	2,346	2,819	3,468	9,782	6,964	11,303	6,114	7,201
Sugar apple	727	1,380	1,705	845	1,211	1,705	2,021	1,248	1,220	589
Papaya	5,332	9,575	12,444	16,393	12,390	5,815	4,177	4,178	4,132	1,146
Mangosteen and Guava	-	589	567	412	1,366	1,126	1,168	1,301	1,425	277
Watermelon	343	561	700	958	853	954	1,143	1,398	1,802	397
Tomato	3	123	173	1,360	2,123	3,270	5,731	3,753	2,556	1,430
Onion and Garlic	1	203	1,946	6,144	7,715	7,872	6,255	6,711	18,555	21,762

EXHIBIT 4

Export Value of Selected Thai Fresh Fruits and Vegetables
(in US $1,000)*

Fruits and Vegetables	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 (Jan - Sept)
Mango	777	846	1,301	835	1,250	2,286	2,171	1,132	1,989	1,188
Orange	479	398	1,320	1,250	1,185	1,559	1,321	1,023	1,041	262
Pomelo	737	682	1,076	1,094	846	1,618	1,815	2,574	2,056	2,390
Longan	3,687	6,171	11,898	8,298	10,018	6,534	12,500	3,775	8,322	2,856
Lichee	-	-	-	-	836	262	480	1,370	695	738
Rambutan	50	150	159	142	158	455	559	635	541	229
Durian	1,504	3,336	2,335	2,578	2,707	6,874	6,939	9,577	4,747	5,017
Sugar apple	221	402	503	224	481	535	459	413	406	238
Papaya	630	1,406	2,740	3,298	2,736	1,471	974	999	1,014	318
Mangosteen and Guava	-	248	216	118	357	333	655	711	674	491
Watermelon	43	90	88	123	155	153	178	233	392	130
Tomato	0.84	27	68	320	497	643	909	575	418	248
Onion and Garlic	0.48	51	412	1,272	1,536	1,771	1,254	1,366	3,754	4,678

* Current U.S. dollars converted at the rate of 25 baht = US$ 1

EXHIBIT 5

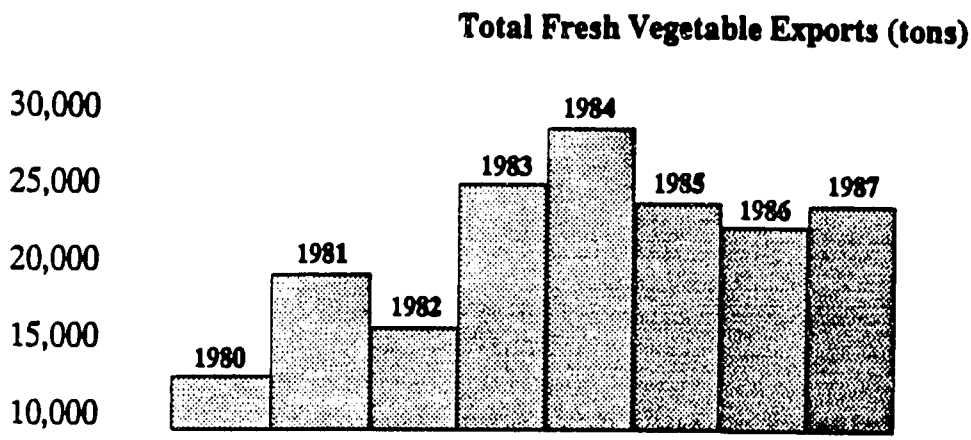

Total Fresh Vegetable Exports (tons)
30,000
25,000
20,000
15,000
10,000
1980
1981
1982
1983
1984
1985
1986
1987

EXHIBIT 6

Export Quantity and Value of Thai Fresh Vegetables

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total Vegetables (tons)	10,631	16,416	15,636	24,378	26,973	24,027	22,423	23,738	NA
Total Vegetables (U.S. $1,000)	2,068	2,666	4,770	5,659	6,376	6,278	5,342	6,773	

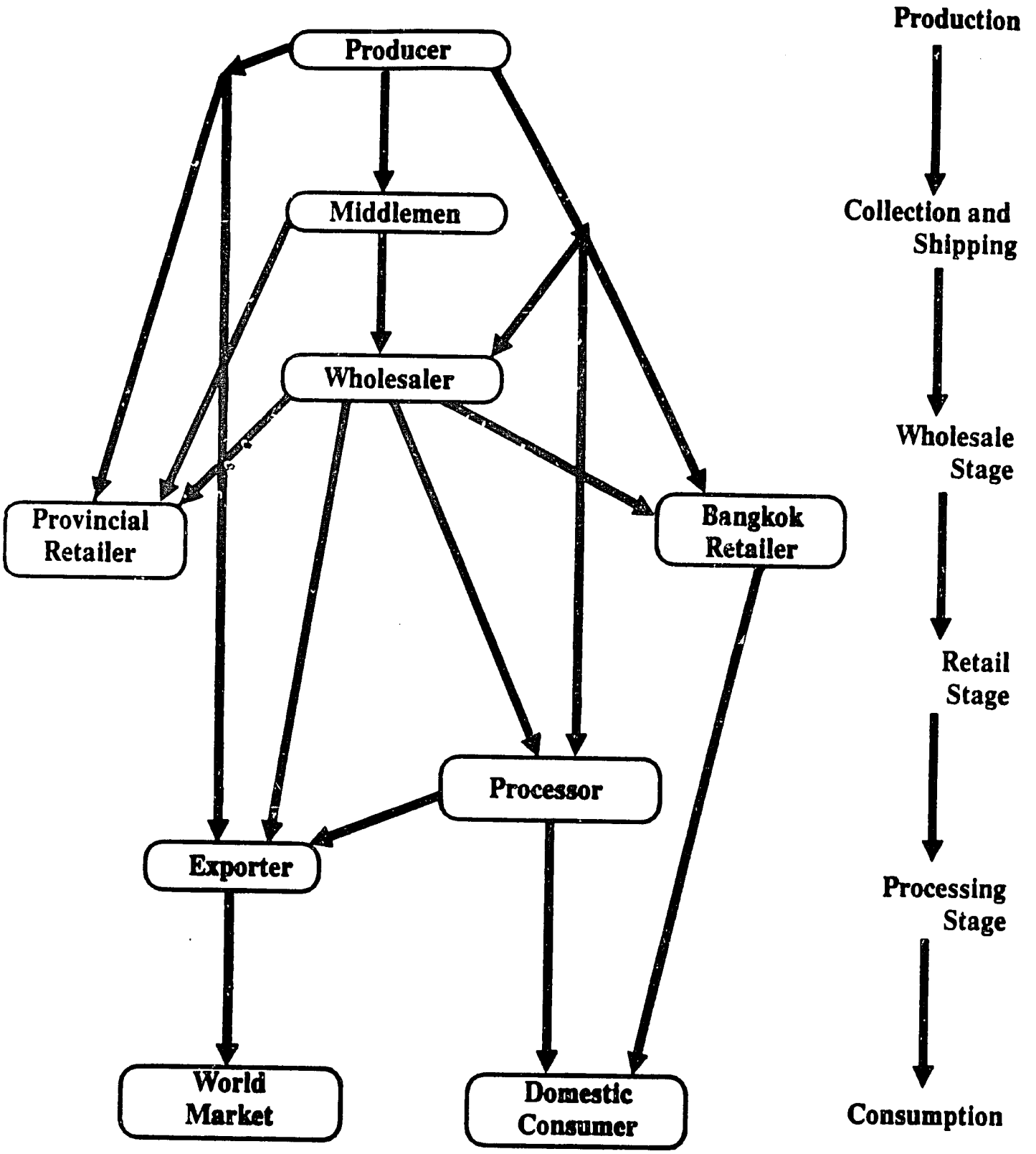
The demands of the end buyers and consumers have the greatest impact on marketing channels and stages for FFV in Thailand. Domestic demand is determined mainly by price rather than quality. This is primarily because most Thai FFV consumers have low incomes relative to consumers in export markets. Export demand is more quality-driven, with price being an important secondary factor. Transportation costs have the greatest impact on final export prices and demand.

Exhibit 7 provides a simplified picture of Thailand's FFV marketing system. As the diagram shows, local middlemen and wholesalers are key individuals in the system, particularly near the producer level. This is because most growers operate small farms and usually are not able to transport produce themselves to the large domestic market and export terminals in Bangkok. The many middlemen and wholesalers generally do not operate on a large scale. Their main capital investments may be small pickups to collect FFV from farmers and deliver them to local retail markets, processors, regional wholesalers, and exporters. Some may operate small packing houses, or arrange to have this done in simple, local packing facilities, before the produce is transported to the export terminal. Larger exporters may have a more sophisticated system to move products from their contract farming areas, into packing facilities, and to the export terminal in cool storage containers.

Although the Thai FFV export marketing system is still relatively inefficient by the standards of some countries, it is clear that the system is undergoing positive changes. To satisfy the quality demands of foreign buyers, it is developing into a more sophisticated system using higher levels of technology. Many of these developments are the result of foreign investment. Companies such as Talat Fresh, a subsidiary of Shell Oil Co.; Thai Topy, a Thai-Japanese venture producing and exporters asparagus to Japan; and other exporters with foreign connections are making the needed investments in technology and methods to streamline the marketing system.

EXHIBIT 7

Thailand's FFV Marketing System



2. ORGANIZATIONS

2.1 Public Sector: Thai Government

2.1.1 Ministry of Science Technology and Energy (MOSTE), Thailand Institute of Scientific and Technological Research (TISTR)

TISTR, a state-supported organization founded in 1963 under MOSTE, is charged with developing Thailand's scientific and technical capabilities. One of its key missions is to assist the private sector in developing and improving technology. TISTR has the following objectives:

- To initiate and conduct research in order to provide scientific and technological services to state agencies and private enterprises for economic and social development of the country;
- To conduct scientific and technological research to promote the use of natural resources appropriate to the economic conditions, environment, health and welfare of the people;
- To improve productivity in accordance with Government policies by propagating results of scientific and technological research in agriculture, industry and commerce;
- To train scientific and technological researchers;
- To provide for testing, measuring services, and other scientific and technological services.

Thai Packaging Center (TPC) and Research Service Center (RSC). TISTR's RSC and TPC have been most influential in helping private firms develop export markets. TPC was established to upgrade the quality of products, minimize losses, increase exports, raise national packaging standards, and serve the needs of the government and private sectors. TPC is involved in the following packaging activities:

- Packaging services, including material quality, style, packing method, and cost;
- Testing of packaging materials and containers;
- Providing technical consultation and technological information;
- Providing coordination between users and manufacturers of packaging materials; and
- Conducting packaging seminars and training programs to suit specific client needs.

The RSC is responsible for organizing research projects requested by other agencies and the private sector.

2.1.2 Ministry of Commerce (MOC)

The objective of the Ministry of Commerce is to facilitate and regulate commercial business in Thailand, both internally and externally. The Ministry, established in 1979, is composed of seven departments. The Department of Export Promotion and Department of Foreign Trade have been the main agencies responsible for FFV export development.

Department of Export Promotion (DEP). The DEP has clearly been one of the most influential government organizations in developing exports of Thai products, particularly fresh fruits and vegetables. Besides conducting promotions domestically and in foreign markets, DEP provides advisory services, product displays, and information to foreign buyers. It also makes facilities available to foreign buyers who want to meet with domestic suppliers. Further information on DEP is given in section 8.2.1.

Department of Foreign Trade (DFT). The DFT formulates trade policies and regulations for export products and also does the following:

- Promotes exports;
- Controls trade of certain goods for the protection of producers and consumers;
- Sets up standards for export products and ensures that exporters and surveyors meet these standards.
- Organizes Thai regulations and studies regulations of other countries to facilitate exports of Thai products.
- Engages in trading when it is beneficial to Thailand's interests.

2.1.3 Ministry of Agriculture and Cooperatives (MOAC)

The MOAC is another key public sector organization responsible for assisting the fresh fruit and vegetable industry. There are nine major departments of the Ministry. Of these, the Department of Agriculture (DOA) and Department of Agricultural Extension (DOAE) have been the most influential in development of fruit and vegetable exports.

Department of Agriculture (DOA). The DOA is the main agricultural research organization for the Thai Government. Of the 12 divisions within the Department, the Plant Pathology and Microbiology Division has been the leading organization in technical and cooperative research to develop FFV exports. Most of their work has concentrated on fruit crops, with special emphasis on preservation and handling techniques. Fruit fly control has also received considerable emphasis.

Horticultural Research Institute (HRI). HRI is also administered under DOA. HRI is responsible for research and development for yield improvement of horticultural crops. It has six independent research centers and 12

satellite research experiment stations throughout the country. Approximately 80 percent of HRI's efforts is in varietal selection and cultural practices. Research results are transferred to provincial officials of DOAE for use in their programs. The remainder of HRI's budget is for research in the areas of chemicals, soil testing, and postharvest handling. HRI cooperates with TISTR in postharvest research.

Department of Agriculture Extension (DOAE). One of DOAE's 10 divisions, the Crop Promotion and Training Division has been most influential in developing fruit and vegetable exports. There are 73 provincial offices located throughout Thailand with the objective of passing technology to producers and provincial processors. Technology is received through DOA, TISTR, and DOAE field trials. DOAE is the most influential agency in reaching producers.

2.1.4 Bank for Agriculture and Agricultural Cooperatives (BAAC)

BAAC is a state-owned agricultural bank which provides credit to farmers and agribusinesses. BAAC has offices in several locations in the Bangkok metropolitan area and in the main provincial centers throughout the country. Like agricultural credit institutions in other countries, the BAAC is a "lender of last resort" to many farmers who cannot secure credit through commercial banks. Because of its ties to the Government and its direct interface with farmers and agricultural businesses, BAAC is a key implementing agency for policies affecting the private sector. It often works closely with agribusinesses to initiate and facilitate contract farming, processing, marketing, and other ventures.

2.1.5 Ministry of Communication and Transportation (MOCT)

The MOCT facilitates and regulates all aspects of communication and transportation in Thailand. Issues relating to aviation, land transport, merchant marine transport, post and telegraph, and meteorology are handled within this ministry.

2.1.6 Thai Airways International (THAI)

THAI is a world-renowned airline, state-owned and strongly influenced by the Thai military, which still commands considerable influence in the Thai Government and is thus able to affect policies. THAI is the leading carrier of passengers and air cargo in and out of Thailand. Because of its close association with other branches of the government, THAI has also been

influential in cooperating with other public and private sector organizations to develop exports of fresh fruits and vegetables.

2.2 Public Sector: Bilateral and Multilateral Agencies

Many international agencies are represented in Thailand and have influenced FFV export development through direct assistance to Thai Government agencies, or indirectly through their involvement in other economic and agricultural development programs. Key agencies include:

- Food and Agriculture Organization (FAO),
- U.S. Agency for International Development (USAID),
- Japanese International Cooperation Agency (JICA), and
- Association of Southeast Asian Nations Food Handling Bureau (ASEAN FHB).

2.3 Private Sector

Several private sector firms and organizations have contributed to expansion of FFV exports. Some of these are listed below. Complete addresses are included in the appendix.

The majority of these organizations are exporters, brokers, and transportation companies which have been active in FFV trade. They range from small firms specializing in fruits and vegetables to large, diversified multinational companies with FFV trading comprising only part of their business. Most of these firms are controlled by Chinese interests.

The Association of Fresh Fruit and Vegetable Exporters has made efforts to promote the industry and facilitate trade. Some individuals interviewed said that the association was more effective in promoting the interests of certain exporters and does not truly represent the industry.

Association of Fresh Fruit and Vegetable Exporters
Chain Air Service
East Asiatic Company
Klong Siam
Krung Thai Intercontinental
Pisitachai International
Prapat Farm
Siam Canadian Trading Company
Talat Fresh (Shell Oil Co.)
Tang Hak Kee
TMT
Twins and Friends Co.

3. TRAINING AND RESEARCH

3.1 Background

Training and research is done by all segments of the industry. Exporters, in an attempt to rapidly improve quality and meet growing demand, often utilize public technology and training sources acquired through foreign contacts. Technology is also transferred through BAAC, DOA, DOAE, and major export companies to their contract producers. Research is carried out by major exporters in conjunction with DOA and DOAE to maximize the amount of produce suitable for export markets. Thus, new markets have been opened which were previously closed due to inferior quality or the presence of pests. The opening of new markets for mangoes in Japan through the adaptation of vapor heat treatment is a good example these interactions.

The organization and management of training is primarily carried out by exporters and DOAE. Organization and management of research is the responsibility of DOA, DOAE, and TISTR. Financing of training comes from both the public and private sectors, the latter in the case of integrated exporting companies involved at all market stages, from production through export. Research, on the other hand, utilizes funding from the public sector budget as well as that provided through grants from multilateral agencies and private companies. Level of funding is difficult to estimate because of the confidential nature of some public-private sector cooperation and the reluctance of some public sector researchers to discuss their budgets.

Public sector research agencies have developed programs to serve the practical needs of private enterprises. As a result, private sector firms often approach research agencies, particularly TISTR and DOA, with specific concerns mainly relating to packaging and extending product life through postharvest treatments. The interactions that result are often positive for the industry. Private companies obtain valuable results at much lower costs with better expertise than they would through independent research. Public sector researchers gain insights into the practical needs of the companies and marketing system, thus tending to orient additional research in this direction. Although one private company may gain an initial advantage due to this type of research cooperation, other companies soon adopt many of the results. Eventually, the whole FFV industry gains through a "ripple effect."

Research is underway into techniques such as vapor heat treatment (VHT), hydro cooling, shrink wrapping, waxing, fumigation, and pending research with dry heat treatment. This research is being done in an effort to open new markets such as the United States, Japan and Europe, which are very conscious of quality and infestations of pests, such as the fruit fly and seed maggot. Such research continues to open new markets and allows for better quality produce to reach established export markets. Most of this research is performed using public sector funding through annual budgets. It is supplemented with grants and technical information through multilateral agencies, such as USAID in cooperation with the Postharvest Institute for Perishables (PIP), USDA, and JICA.

3.2 Interactions

3.2.1 Interministry Project

In 1981, as a result of the Fifth NESDB Plan, an Interministry Project (IMP) was developed to form policies within MOAC for improving production and increasing exports of FFV. Eliminating barriers and developing better cooperation between MOAC and other government agencies was also a goal of the project.

Prior to 1990, the annual budget of IMP was approximately 1,000,000 baht ($40,000) with an increase in 1990 to 1,600,000 baht ($64,000). The funds were supplied from MOAC's research budget. Without this Interministry Project, the annual MOAC budget for FFV research has typically been 400,000 baht ($16,000).

The Interministry Project has been the catalyst for public research, particularly trial shipments of FFV, such as the baby banana shipments to Europe. Research results from several agencies have been collected and applied to actual export shipments. The results were shared among project members for further work. The Interministry Project is considered the core of postharvest technology in Thailand.

The stated policy goals of the project were:

- To quicken the varietal improvement of fruits, vegetables, cut flowers, and ornamental plants to produce the quality and quantity demanded by foreign markets;
- To improve packaging techniques to satisfy buyers and be suitable for each type of produce and transport mode in the market chain;
- To extend this technology to both farmers and exporters;
- To expand foreign markets of fruits, vegetables, cut flowers and ornamental plants particularly in Asia, Europe, and the Middle East; and
- To encourage both government organizations and private enterprises to co-operate in improving production, marketing, trade, organization, legal and business procedures, and transport for export.

The objectives of IMP were to improve production and export of fruits, vegetables, cut flowers, and ornamental plants and implement research both before and after harvest. The domestic demand for produce was taken into account. Actual trial shipments were done before results were passed on to farmers and exporters in order to more effectively serve the private sector.

In order to achieve the objectives, a subcommittee of the project was formed from the Committee on Agriculture and Cooperative Development Policy

and Planning. This subcommittee consisted of representatives of the following: MOAC, DOA, DOAE, Cooperative Promotion Department, Office of Agricultural Economics, Marketing Organization for Farmers, Government Cold Storage Organization, Ministry of Foreign Affairs, Commercial Relationship Department, Customs Department, Aviation Department, Thai Airways International, Airports Authority of Thailand, Port Authority of Thailand, TISTR, producer groups, and exporters.

Pre- and postharvest research from the different agencies was performed with emphasis on improving the export sector of FFV. As a result of collective research information provided by the different agencies, several trial shipments of FFV to Europe have occurred. Details of these shipments are provided in sections 7.2.1 and 5.2.1

3.2.2 Seminars

Universities, DOA, and TISTR organize seminars to inform producers about current information and techniques to increase efficiency, quality, and production. In addition, DOA annually organizes four or five seminars at Kasetsart University on postharvest handling of FFV which are directed to producers, processors, and exporters. Also attending are public sector personnel such as DOAE staff who often distribute information to the private sector through grower seminars, publications, field visits, and other extension-related methods. Attendance of 100 or more, including government agency representatives, is typical at the seminars.

A common practice is to schedule seminars following trial shipments, as in the case of baby bananas to Denmark and a mixed fruit container to Germany, in order to inform producers and exporters of results and discuss ways to overcome problems. Interest in additional trial shipments often results from exporters learning of current research and new postharvest techniques.

The phytosanitary station at Don Muang Airport (section 6.2.1) is a result of public/private sector interactions at seminars.

Some exporters stated that seminars have been of questionable value, tending to repeat previous programs and offering little new information. Although these complaints may be legitimate, they are more likely symptoms of poor preparation and content. Generally, it appears that seminars and other venues for communication have effectively brought public and private sector people together, which is in itself an accomplishment. As it is anywhere, it is difficult to quantify the impacts of individuals sharing ideas.

The Technical Information Center for Agricultural Export Commodities of DOAE publishes a bimonthly newsletter for exporters and processors with news of trial results, current research, and problems within the industry. With the recent acquisition of a computer, DOA also plans to enter data regarding postharvest handling and export of FFV so that information can quickly be made available upon request.

As a result of seminars and newsletters, DOA receives approximately 200 requests annually for information on postharvest handling and export techniques for FFV.

3.2.3 Consultants

The DOA Plant Pathology and Microbiology Division (PPMD), in cooperation with the Postharvest Institute for Perishables (PIP) of the University of Idaho, has made extensive use of consultants and other experts to address FFV export problems, particularly problems related to quality preservation and fruit fly control. The MOA's Agricultural Technology Transfer project (ATT) has funded much of this work. The ATT projects were funded by USAID. Since 1985, ATT has spent nearly U.S. $400,000 on the DOA/PPMD projects. Not all this funding was spent on consultants. Much was provided directly to DOA researchers for laboratory and field research using local staff.

Consultants were employed to assist in developing cooling and storage equipment; review trial export shipments to Europe; make recommendations for marketing and technical improvements; and provide technical expertise to Thai researchers working on shrink wrap, vapor heat treatment, and other methods for control of fruit flies. Often, these consultants gave seminars and lectures and participated in conferences.

4. PRODUCTION

4.1 Background

Improvements in production come slowly compared to other segments of the market channel. Although considerable development has taken place in the past 20 years, most farmers have low incomes and are remote from major markets. With over 60 percent of the Thai population active in farming and most farms less than 5 ha in size, production of FFV in Thailand involves hundreds of small farmers and family units. For many, farming is an occupation handed down from one generation to the next, along with the land. In the past, production depended on domestic markets and consumer demands, but now is in transition with greater emphasis on export markets.

Traditional methods are often unable to produce the quality required for export markets. Often, farmers use the same methods year after year, with little regard to targeting the export market. This lack of market awareness hampers efforts to efficiently supply better quality produce.

The farmer perceives greater use of fertilizers, chemicals, and postharvest handling procedures as an unnecessary cash or labor outlay rather than an opportunity to increase net profit. Even though farmers may be aware of the advantages of using different production methods, many simply lack the money or time to invest. If they wish to use these methods, farmers must often borrow money. This can lead to a dependent relationship with financial institutions or local money lenders which they prefer to avoid. For some, assets are so minimal that lenders will not provide loans or adequate funds to make needed improvements.

To tackle this problem, one DOAE objective has been to transfer applicable technology and procedures to producers at little or no cost in order to more economically obtain better production efficiency and higher product quality. DOAE has offices and extension workers in all 73 provinces, so it is the lead agency in transferring agricultural technology to farmers.

DOAE obtains information on advanced technology and procedures through DOA, TISTR, and seminars. This information is then channeled through district offices, where extension agents meet with producers and farmer groups to complete the transfer of information.

District officers and agents of DOAE must gain the respect of the farmers and prove their expertise before new methods are accepted. It is customary for the District offices to have field trials and demonstrations to introduce techniques and encourage application by the farmers.

Social interactions play a major role in the speed of acceptance of new production methods. A frequent obstacle to introducing new methods is the continued acceptance of traditional practices by older generations and the reluctance of younger generations to challenge their elders. Thai society is very hierarchical and respect for elders is part of the core of social relationships. Also, the Asian concept of "losing face" sometimes inhibits farmers in traditional communities from trying new methods. To fail causes

embarrassment, so it is often easier to go along with proven methods. These aspects of Thai culture have been a greater barrier in the past, however, and are gradually being tempered with eagerness to accept new methods.

At present, larger farms are developing production areas which allow for greater benefit from the use of new technology and methods. Larger producers and contract growers, typically the leaders in utilizing newer technology, obtain information through seminars and recommendations from exporters.

Some contract farms are financed by major exporters, with support from commercial banks or BAAC, to ensure a sufficient supply for processing. Asparagus production provides an example of large Japanese companies working with Thai companies who contract with farmers. These are not necessarily the larger farmers. Groups of smaller producers have formed informal producer groups that trade information and act as a unit in dealing with middlemen and buyers. This combined effort helps them obtain better prices for their produce.

It appears that the majority of FFV exports move into the market via Chinese trading companies that have developed their businesses over many years with a minimum of capital investment.

In many cases producers and exporters mistrust and take advantage of each other. Often the producers supply less produce than promised. Another problem for exporters is the common practice of producers and wholesalers of blending poorer quality produce with produce suitable for export. Wholesalers and exporters commonly try to hold down purchase prices by claiming inferior quality, and in some cases, fixing prices in conjunction with other purchasing agents.

The lack of respect for contractual obligations, which is not unique to the FFV business, may be partly explained by the traditional distrust between farmers and middlemen. Another cause may be that Thai marketing systems traditionally have not been based on contract. Products usually were supplied with the understanding on both sides that quality would vary considerably. However, as markets have developed for higher and more uniform quality exports, marketers have tried to obtain the needed produce via marketing contracts. Research for this report indicates that as exporters establish more integrated production and marketing systems, closer relationships also develop between producers and exporters.

4.2 Interactions

4.2.1 BAAC

BAAC, the "lender of last resort" for farmers, often cooperates with private agribusinesses and groups of farmers to finance and sometimes participate in production. One example of this is BAAC working with East Asiatic Company (EAC) to produce baby bananas for export. Another example is its participation as a shareholder in New Generation Farms to produce FFV for market.

In the EAC situation, BAAC provided funds for planting materials, additional labor, crop inputs, equipment, and transportation to the growers. BAAC worked closely with the growers but retained title to the production and actually sold the produce to EAC. Information on the reaction of the growers to this arrangement was not available.

New Generation Farms is a Thai company which BAAC established with local Thai companies, including Pattaya Foods, a local canner, and F.E. Zuellig, an international trading firm that deals in a variety of commodities. Other local firms also participated. BAAC held 50 percent of the shares, with the other participants retaining about equal shares. BAAC formed the company in an effort to bring together agribusinesses which could offer market outlets to farmers in "new" production areas being funded by the bank. The company was not successful for several reasons. Mainly, production and marketing costs were too high because expatriate staff was retained to manage both operations. Beside being too expensive, managers did not prove to be competent in marketing. Export shipments of fresh baby corn to Europe were especially big losers. As a result, the company hired lower cost Thai staff and concentrated on producing for domestic markets. This strategy does not, however, appear to be enough to recoup earlier losses.

4.2.2 The Royal Project

In 1969 His Majesty the King launched the "The Royal Hilltribe Development Project," now called "The Royal Project." This project aimed to eradicate opium production in northern Thailand among the hill-tribe farmers by establishing settled agriculture. As a result of the Royal Project, ecological degradation and deforestation have declined while the socio-economic status of the hill-tribe people has improved. The Royal Project, known throughout the world, is used as a tool to highlight FFV grown in Thailand. Many officials from all branches of Government have worked with it. To be asked to participate in the project is considered a privilege and honor derived from association with the Royal Family.

Another positive impact of the project has been the promotional aspects for the Thai FFV industry by highlighting the industry among tourists and higher income domestic consumers. Major hotel chefs participate in the project as advisors (promoters) and feature FFV on menus. The newspapers also cover this activity. There is also a Royal Project shop at the Chiang Mai airport, a gateway to a major tourist area. Tourists who stay in hotel rooms in all areas of the country often find fresh tropical fruit trays in the room. Vendors are everywhere. In short, most visitors from abroad see and taste FFV in a variety of ways. This exposure assists exports.

It is worthwhile to note that tourist arrivals have increased from 2.8 million people in 1986 to 4.8 million in 1989. Last year's arrivals were over 6 million. Tourism revenues increased from about 20 billion Baht in 1981 to about 95 billion in 1989. The Tourism Authority of Thailand and the Department of Export Promotion have cooperated in these promotions.

More than 300 researchers, extension workers, and key farmers are regularly involved in the project. Between 1985 and 1989, vegetable sales from the project increased from 34 mt worth 180,000 Baht ($7,200) per annum to nearly 500 mt worth 3 million Baht ($120,000).

The United Nations, including the Food and Agriculture Organization (FAO), other international agencies, and several countries, such as the United States, Japan, West Germany, Australia, Israel, and the Netherlands, joined His Majesty's campaign and have been supplementing the efforts in providing grants, seed, and production technology. FAO, besides being a partner with the Thai/UN Highland Agricultural Marketing Production Project, has provided technical support to improve production of mushrooms, vegetables, and tea in the Northern provinces.

The wide variety of FFV produced has only a small impact on Thailand's total supply destined for export due to the remote location of the production areas and subsequent transportation costs. However, the greatest influence on the export sector is the promotional aspect and the widespread application of production, handling and marketing techniques. The Royal Project uses brochures, cooperation with major hotel chefs in Bangkok, sales outlets at the Chiang Mai Airport, and other promotional tools to boost sales recognition of the project.

Several university and government scientists throughout Thailand are involved in research to identify suitable crops and associated technology used in Royal Project production areas.

The crops are purchased from the hill-tribe producers and brought to simple collection stations before being transported to a central packing house. Refrigerated 4-wheel drive trucks are used to transport some of the production. The produce is graded and packed under the trademark "Doi Kham" at a packing and storage facility at Chiang Mai University and transported by truck or air to local and Bangkok markets. Because of their high quality, these graded and packed FFV are used in promotional campaigns for the Royal Project and Thai fruits and vegetables. Some of the commodities are exported through normal channels.

The Royal Project is a unique example of interaction among many organizations. Its success is due mainly to the popularity of and respect for the King and his efforts to eliminate a social problem. While some useful examples may be drawn from the Royal Project, it is unlikely that it could be duplicated in other countries.

4.2.3 Consultants

In January 1990, Len B. Wooten, a postharvest physiologist from Washington State University, traveled through much of Thailand observing production. This interaction resulted from a request for assistance from DOAE through Volunteers in Overseas Cooperative Assistance (VOCA) in Washington, D.C.

offices to familiarize himself with the concerns of each district. After a general exchange of ideas, he traveled to farms, processing facilities, and storage centers to see firsthand the techniques used and to advise on better production and handling methods.

On several occasions concluding his district tours, DOAE conducted meetings for farmers and farmer groups and cooperatives involved in contract farming with local exporters.

As they become more aware of the importance of quality, farmer groups, cooperatives, and contract farmers grow more enthusiastic toward improvements than individual farmers are. This is often a result of dealing directly with packers and exporters rather than brokers and wholesalers. By encouraging new production and quality control methods through direct or cooperative field support programs, the exporters and packers get the quality they want and build stronger, lasting relationships with producer groups.

Wooten visited two DOAE research stations which were performing trials and interpreting data. At the Kampengsan Campus of Kasetsart University, Nakhon Phatom, trials are being carried out on vegetable varieties for adaptability to Thailand. As results are obtained, seeds and technology are distributed to commercial growers through DOAE district offices.

DOAE and farmers more commonly interact when small-scale field trials are performed using fertilizer or pest management practices. At a DOAE pest control trial observed in Prachuab Khirikhan, Wooten noted that in using netting, "The spray program was reduced by 80 percent and the harvest quality of the product was greatly improved over that of conventional spray programs."*

Results of such field trials are then transferred to other districts through DOAE. Improved quality as a result of DOAE's efforts has a direct relationship to the improved quality of FFV destined for export.

Along with his personal experience and expertise, Wooten provided reference materials from the U.S. for interpretation and application in Thailand through DOAE testing.

* Note: Netting is a screen material, usually made of nylon. It is placed over plants to keep insects away. Its manner of use varies with the type of plant being protected. The reduction in infestations of larvae, blemishes, etc., serves to enhance quality.

5. PACKING AND PROCESSING

5.1 Background

Packing and processing constitute one of the most dynamic areas of fresh fruit and vegetable exports. With the cooperation of producers and exporters, DOA, DOAE, and TISTR have devoted a great deal of time and effort to improvements in packing and processing. DOA has made several trial shipments to test new methods of preservation and packing. TISTR's Packaging Center and Research Service Center have also been leaders in working with private sector firms to improve packing methods and materials.

Most packing and processing activities are initiated at export facilities. The average producer has little concern for this stage of the marketing channel. Where FFV are grown primarily for high quality markets, simple open-sided collection and sorting sheds with grass thatched roofs located close to producers are generally the first stage of the packing process. These sheds, which may be set up by grower groups or in cooperation with exporters, often are used as a place for growers to meet.

After field packing and sorting, most FFV are transported by truck directly to the export point or to a warehouse or cool storage center near the export location. At this point, final sorting and packaging for exporting is completed.

In some cases, importers provide new ideas for packing methods and containers. While these are not always appropriate for exotic fruits, they sometimes can be adapted or improved for use in Thailand.

5.2 Public-Private Sector Interactions: Mango Shipments to Japan Using Vapor Heat Treatment

A broad spectrum of private and public sector participants in Thailand and Japan have interacted to develop postharvest procedures that have allowed fresh mangos from Thailand to be accepted in Japan.

In the past, Japan has been one of the most difficult markets to access. The appearance and quality of produce must be exceptionally high to be accepted in Japan. The Japanese market also requires pest-free produce. The large demand in Japan, combined with severe import restrictions, has created a difficult situation. Once an acceptable arrangement was reached, the possibilities were opened for significantly increased exports to Japan.

Dr. Prapat, a noted mango producer from Chiang Mai province, initiated the effort to open the mango market in Japan. The first step was to ask high-level Thai government officials to use their influence with Japanese authorities.

Government officials were receptive to Dr. Prapat's proposal to invite a Japanese delegation to Thailand for the express purpose of opening the Japanese market to Thai mangos. The Thai Government invited Japanese Government officials and plant quarantine authorities to Thailand. In

addition to the customary social affairs attended by visiting dignitaries, a trip was scheduled to Prapat Farm in Chiang Mai, a progressive mango production and packing site. The Japanese officials witnessed firsthand the extensive measures taken in pest control, quality assurance, and packing, an experience which considerably improved the possibility of shipping mangos to Japan.

While the Japanese officials accepted the conditions under which mangos were grown and harvested, they were still concerned about the prevention of fruit fly infestation. At that time, Thailand had no proven methods to ensure that its mangos would be free of fruit flies.

The agreement to accept fresh mangos from Thailand stipulated that the fruit be processed using a Vapor Heat Treatment (VHT) to guard against fruit flies. In addition, all processing was to be done with Japanese health officials present at all times. The Thai government was to purchase equipment for the VHT process from Japanese manufacturers.

Two machines were purchased from Japan for 25 million baht ($1 million) each with DOAE funds. One machine was located at DOAE's main office near Bangkok and the other in Chaing Mai. The actual cost of each VHT facility is 60 million baht ($2.4 million) including the structure in which the machinery is housed.

Bids were accepted from five FFV export companies to lease the VHT facilities. The contract was awarded to Krung Thai Inter-Continental Company in September 1989 to operate both facilities for a five-year lease of 27.6 million baht ($1.1 million). Of this lease amount, 2 million baht ($80,000) was to be used in research on similar treatment for other fruits. The remainder was to offset the cost of facilities. The balance of nearly 69 million baht ($2.7 million) was absorbed by the DOAE annual budget. At the end of the five-year lease, the facilities will become the property of DOAE.

Contract provisions require that 50 percent of the mangoes processed be from exporters other than Krung Thai Intercontinental. The charge to process mangoes for other exporters is not to exceed an amount of 12 baht ($.50) per kg. Krung Thai has reported processing rates of 300 kg per period while optimum capacity is 5 tons per period. Krung Thai expects to export 5,000 tons of mangoes to Japan from 1989 to 1993.

Because the Japanese market prefers mango varieties that are not currently being promoted under DOAE recommendations, the supply of mangoes is insufficient to meet Japanese demand. The Japanese demand is limited to the Nam glan waan variety, which is susceptible to fruit fly infestation. Because they are unable to rely on an adequate demand for this variety, and because the Nam glan waan is susceptible to fruit fly infestation, DOA/DOAE has been promoting an alternative variety (Nam dawk mai) that is fruit fly resistant.

Despite the lack of varietal promotion, the demand for this variety is increasing in other Asian countries. Unlike the strict requirements of Japan, other markets in importing countries readily accept lower quality,

untreated fruit. Producers and exporters tend to avoid the additional procedures required by Japan and are exporting to other Asian countries with more lenient requirements.

In an effort to increase the available supply for VHT treatment, Krung Thai International and DOA are working together to speed up propagation through budding and grafting onto existing trees of other varieties. The results of these propagation techniques were incomplete at the time of this study.

6. QUALITY CONTROL

6.1 Background

Final Quality Control (QC) in nearly all exports of FFV from Thailand is determined by the importer who has the right to refuse produce that does not meet specifications. Most importers maintain different market requirements with some degree of flexibility in produce quality depending on the target market.

In the past year, some vegetable shipments have been inspected by certified inspection companies such as Société Générale de Surveillance (SGS), a well-known international inspection company. However, quantities are not large. Costs of about US$100 per inspection are also considered to be too high for most shippers. According to some trade sources, the use of inspection services is not expected to increase appreciably in the near future because of costs and buyer and seller beliefs that inspections are not fair. However, this type of inspection is still new in Thailand and usage may increase with experience. The lack of standardized quality specifications may also be a limiting factor, although exporters and inspectors did not mention it.

Payment is usually made by letter of credit (LC), activated within seven days of receipt of the produce by the importer. This aspect alone puts the exporter at great risk and serves as a self-governing mechanism to maintain QC.

While QC is critical to consumer acceptance and growth in exports, little emphasis is placed on grades and standards. Currently Thailand has no internationally accepted grades and standards that apply to fresh fruits and vegetables. (Standards are now being introduced by the Horticultural Research Institute, however. See Section 6.2.3.) Most exporters are using only general guidelines. This lack of predetermined grades and standards allows for a wide variation in quality, so exporters must rely on their knowledge of buyer preferences to know which standards will be acceptable. This is not necessarily a problem, however. Exporters usually know through experience the levels of quality demanded by various buyers. This trade experience, combined with the payment and shipment terms mentioned above, ensures that most export shipments have no quality problems. If problems do arise, buyers and sellers fall back on established payment mechanisms to settle disputes.

Adoption of official quality requirements could benefit the industry. While establishing such a system may have some benefits, however, the wide range of markets and quality requirements may not ensure that private traders change their current practices. Although there are government initiatives to adapt foreign standards, the preferred method for exporters and buyers is to work out quality requirements privately amongst themselves.

6.2 Interactions

6.2.1 Phytosanitary Inspection

Presently, all exported FFV are subject to phytosanitary inspections by DOA's Plant Quarantine Subdivision and general inspection by the customs authorities. Thailand currently has 16 phytosanitary inspection stations. These include DOA phytosanitary testing stations at Kasetsart University Bangkhen; Klong Toey seafreight terminal; each of Thailand's four international airports; and border crossings into neighboring countries.

Prior to 1987, phytosanitary inspections of samples taken at Don Muang International (DMI) Airport were performed at Kasetsart University under supervision of DOA's Plant Quarantine Division. In 1986, exporters proposed at a Department of Export Promotion seminar that inspections take place at the DMI airfreight facility because samples transported from DMI to Kasetsart University caused delays of up to three hours in packing the FFV into shipping containers. During the waiting period for inspection certificates, products were not permitted to be loaded into airfreight containers. This waiting period often left FFV at ambient temperatures (30-38 degrees C) causing spoilage. In some cases, produce had come direct from cold storage facilities but suffered severe spoilage while waiting for departure.

In 1987, an additional inspection station was installed at DMI in space provided by the Airport Authority. As a result of the interactions of exporters, DOA, DEP, and the Airport Authority, phytosanitary testing at DMI has been streamlined. This has resulted in faster service to exporters, less spoilage, and higher quality and volumes of produce being exported from DMI.

6.2.2 Cold Storage

Cold storage is one issue where more public-private interaction is needed. Cold storage (CS) at DMI is an ongoing issue in Thailand. Aircraft used to export FFV have no refrigerated space on board, making it necessary to use insulated shipping containers for cooled produce to minimize fluctuations in temperature and the resulting spoilage.

Exporters generally disagree about the need for more cold storage at the airport. Some larger export companies maintain cold storage facilities of their own. Since they are not dependent on public or leased facilities, exporters have more control over their products by allowing cooled FFV to be transferred to the airport immediately prior to shipping. However, these exporters assume that their produce will remain at the airport for only a few hours before departure.

On the other hand, wholesalers and smaller exporters must deliver produce to the airport directly from production areas and collection points in hopes that it will be packed and shipped as quickly as possible. The greatest risk of spoilage occurs when small volume orders arrive at the airport or when flights are delayed or overbooked. Numerous reports have been made of packed containers remaining on the tarmac for a day or more in the intense heat

waiting for available cargo space. In the worst cases, the exporters do not hear of such delays until importers awaiting shipment contact them.

The present CS facility consists of nine units of 50 cubic meters each. Of this 450 cubic meters, a generous portion has been devoted to orchids awaiting shipment, leaving FFV second on the priority list. There is no surcharge beyond the normal 50 baht ($2) terminal charge per shipping container for use of the facility.

As a result of exporters' requests and MOCT's awareness of the problem, a cargo expansion project at DMI Airport is on-line to be completed in 1991. This expansion project will include 10 additional units totalling 6,000 cubic meters of cold storage, which will be used exclusively for FFV.

The equipment for this CS expansion is estimated to cost 125,000,000 baht ($5 million) and will be purchased by Thai Airways. The Airport Authority will direct and finance construction of the air cargo facility. Once the facility is operational, THAI will lease CS space from the Airport Authority for 1,000,000 baht ($40,000) per month. Anticipated recovery time for equipment and construction costs is three years. As with the present situation, the expanded facility will be able to charge only 50 baht ($2) per container for use of the facility.

6.2.3 Horticulture Research Institute

In 1986, the Horticulture Research Institute under the DOA began the process of establishing grades and standards for FFV. At this time criteria, which have been established only for durian, rambutan, and mango, set requirements by variety and for size, weight, color, internal and external characteristics, and taste.

Producers and brokers have not readily accepted these standards for several reasons. Now that different grades are established, a larger proportion of the produce is classified as not acceptable for export. Previously, the inferior fruit was blended and sold at a lower price. Educating the producers to grow for the better grades has been a challenge. In the case of durians, grade one is 2.5 - 3 kg. However, producers thinking "bigger is better" tend to harvest larger and heavier produce, which results in a lower grade product. In the effort to establish grades and standards, there is concern about complying with international standards, specifically those of Hong Kong and Singapore.

DOA has proposed a seminar to be held in Bangkok in 1991 or 1992 in cooperation with PIP, other international agencies, and private companies to address this issue further. Representatives from the EC, and USDA/APHIS and Japanese quality control specialists are expected to be key participants in the seminar.

7. TRANSPORTATION

7.1 Background

7.1.1 Domestic Market

Fresh fruits and vegetables are shipped by almost every possible mode of transportation. Motorcycles, small boats, and four-wheel trucks are used to move produce from producers to local collection points. For long distance domestic transport, boats and trucks of various capacities are used. Rail transport is not common. While boats are the cheapest form of domestic transportation, not all wholesale markets can be reached by water.

7.1.2 Export Market

Transport of FFV for export from the farm or first collection point is often arranged by exporting companies. This insures more control over the timing of delivery to packing houses or export facilities. Most exporters use local middlemen with small pickups to handle the origination. Exporters may also have their own origination teams who inspect the produce and then transport it to packing or larger collection locations. The more sophisticated (recent entries) in the export business may have better integrated systems, but this seems to be more an emerging trend than common practice. All of these contacts with local growers are usually done by phone to the farmers via local village headmen, officials, or influential people. Larger farmers may be contacted directly. There may be coordination of production and harvesting schedules, but since most of the FFV are perennials, the crop must be handled when it is ready. Annual crops, especially vegetables, lend themselves to closer scheduling.

After the exporter receives and packages the product it is shipped by one of three modes of transportation: overland trucks; seafreight; or airfreight.

Overland truck. Trucks are the most economical means of transporting FFV into the Malay peninsula and sometimes as far south as Singapore. However, this form of transport adversely affects quality of the fruit. Most trucks are multi-purpose and open-sided with only a canvas cover offering little protection against heat, rain, and dust. Due to a ban on logging imposed in Thailand in 1988, nearly all lumber for construction must be imported from Malaysia. This encourages the use of these multi-purpose trucks, with lumber as an easy back haul. Refrigerated trucks are rarely used due to higher freight rates and lack of perishable products available for back haul.

At the Thai-Malaysian border, FFV are transferred to enclosed trucks registered in Malaysia with permits to operate in several countries. These trucks usually lack refrigeration, although refrigerated trucks are available. Due to exposure to the elements, additional handling, and rough roads, FFV arriving at the final destination are in poor condition and command a lower price.

Seafreight. Seafreight is widely used to serve the Asian and Middle Eastern markets. Produce destined for shipment by seafreight reaches the port through similar marketing channels as trucked produce. Seafreight allows for the most gentle handling of FFV, causing less spoilage and a higher quality product for the nearby Asian markets. Produce which can be exported by seafreight is that which can withstand the length of the sea voyage and is available in sufficient quantities to fill a container.

DOA and TISTR have conducted research and trials on seafreight with various postharvest chemical treatments, atmospheric conditions, ethylene adsorbents, and containers of mixed commodities. Cooling and atmospheric controls in the containers are used to extend product life. Problems often arise in shipping containers of mixed FFV. Maintaining a controlled environment suitable for a variety of commodities is very difficult due to different rates of respiration. Pending developments in refrigerated ocean transport hold promise.

Airfreight. Even though airfreight is the most expensive form of transport, its increased availability has had the greatest impact on FFV exports. Its popularity is growing because it makes more distant markets accessible and reduces the time between order and delivery. The smaller size of air shipping containers is another reason that many exporters tend to favor airfreight over seafreight.

In 1989, air cargo shipments from Don Muang International Airport approximated 750 tons daily, of which 45 percent consisted of perishables. During the height of the durian season, shipments of this fruit alone accounted for as much as 400-500 tons daily. Durian is a perishable fruit in a class by itself for air shipment. Because of the very strong, penetrating odor of durians, most air carriers refuse to carry them. Passengers frequently complained that their luggage smelled of durian. On Thai Airways, all shipments of durian are handled in the same manner as dangerous cargo, and strict attention is paid to the ventilation system on board the plane.

There are problems during the winter months in trying to expand the export of Thai FFV to Europe due to a lack of space for perishables on aircraft. Flights that are fully booked for passengers and accompanying luggage and loaded with the maximum amount of fuel needed to make the long flight against strong head winds have less than 300 kg of cargo space available for FFV. Furthermore, due to the possibility of rerouting because of bad weather common in Europe, the air carriers are reluctant to take on perishable cargo and assume the associated risk of spoilage.

Due to limited space available for FFV, cargo space is usually pre-booked. Typically, space is reserved one week in advance with one day advance notice of delivery. Freight for some very seasonal commodities such as durians and mangos may be booked up to a year in advance. Bookings are usually made through cargo agents, some of which also act as exporters. Cargo agents usually maintain a line of credit with air cargo companies of 15 days for payment once reliability of the agent has been established. The standard commission for cargo agents for booking space and other arrangements is 5% of the freight rate.

Even with limited air cargo space available for FFV, THAI and other carriers feel little competitive pressure from seafreight. As indicated by THAI officials, increased quantities of FFV exported by seafreight will allow them to make space available for nonperishables at significantly higher rates, decreasing their exposure to risk.

7.2 Public-Private Sector Interactions

7.2.1 Seafreight

In August 1989, a trial shipment of baby bananas was sent to Denmark with moderate success. The initial interest came from a Danish FFV importer. The East Asiatic Company (EAC) and the DOA cooperated to complete this trial, which began with a proposal presented to DOA/PPMD by EAC. DOA responded by offering support with financial aid and organization of producers. Specifically, DOA was responsible for sorting and treating the fruit. EAC was responsible for packing, loading, shipping, and merchandising the product.

DOA contracted with growers to provide the fruit according to specifications. Four weeks prior to harvest, the bananas were treated with Thiobenzinol (TBZ), a fungicide normally used on fruit after harvest. (Fungicides, used to extend the shelflife of fruits, are now an established practice as a result of research by TISTR and DOA.) The crop was then harvested five days ahead of normal harvest time, treated a second time with TBZ, and placed in plastic bags.

Finding enough producers to supply the needed quality of bananas was a problem. Between 12 and 15 farmers had to participate because banana farms are small. In addition, the added expenses of providing sprayers and more labor for bagging discouraged farmer support. DOA provided fungicides and plastic bags at no cost to the farmer. Loans were taken out by farmers from BAAC for fertilizer, equipment, and transportation to EAC's packing facility. EAC purchased the bananas from BAAC to offset the outstanding loans, and surplus funds went back to the farmer. Upon reaching EAC's facilities, the bananas were hand-stowed in a refrigerated container and loaded on a ship destined for Denmark. EAC selected all packing techniques and carton styles. Transit time was approximately 35 days. Problems occurred en route with the cooling system when the container temperatures dropped to zero degrees. Excessive chilling from this malfunction of the cooling system caused some spoilage, resulting in a less marketable product in Denmark. The importer did not order subsequent shipments.

This interaction was unique in that it is unusual for the public sector to assume financial risk for such trials. Similar trials are being proposed with other commodities, such as lichee, but problems are anticipated in marketing container-size lots of one fruit.

7.2.2 Airfreight

Airfreight is by far the most attractive way to ship, mainly because of the public/private sector interaction. Of great importance to air freight is

the government regulation controlling air freight rates of perishable agricultural products. This government order regulation (GOR) has been in effect for more than 10 years and applies to fresh agricultural produce and flowers only. The impetus for establishing such rates was the promotion of Thai agricultural products in the international market. This policy resulted from interactions between MOC and MOCT. It should be noted that the GOR regulates only the rate; it does not stipulate the volume of cargo to be shipped.

Thai Airways International (THAI), which operates as a private business but is owned by the Thai Government, was instrumental in developing this policy. As a state enterprise, THAI balances benefits to the country with its own business concerns. Often, THAI must work to show a profit despite policies that undermine successful business practices. The MOC, at the urging of exporters and producers, cooperated with THAI and the MOCT in order to establish preferred rates for FFV. These rates were established in accordance with regulations of the International Airline Transport Association (IATA) and apply to all air carriers shipping from Thailand, regardless of their country of origin.

Currently, airfreight rates for FFV are from three to ten times that of seafreight to the same destination, yet other air carriers remain reluctant to carry FFV. Nonperishable cargo commands rates three times that of perishable FFV and minimizes risk to the carriers. Therefore, many air carriers allow little or no space for perishables, opting for less risk and higher revenues from nonperishables.

THAI has established a company policy making at least 50 percent of its cargo space available to perishables, including FFV. This policy, in combination with the GOR, is a major stimulus to FFV exports. For example, in 1989, THAI maintained six flights daily to Hong Kong. On the first three flights each day, up to 100 percent of available cargo space was utilized for FFV to ensure that the perishables were shipped during a cool time of day. Nonperishables dominated the cargo space for the later three flights.

The airfreight rate for FFV to Hong Kong is currently 10 baht/kg. In comparison, airfreight to Europe is 62 baht/kg while seafreight to Europe is 12 baht/kg. It is thought that such high airfreight rates to distant countries hinders the expansion of FFV exports. It is not uncommon for freight alone to account for as much as 60 percent of the retail price of Thai FFV delivered to Europe.

8. PROMOTION

8.1 Background

Promotion of fresh fruits and vegetables has been a key element in developing export markets for Thai FFV. With FFV exports contributing increasing amounts of foreign exchange over the past decade, the promotions are important to maintain the upward trend in earnings. Policies stimulating promotion were emphasized in the Sixth National Economic and Social Development Plan of 1987-91. The objectives of these policies were to increase volumes and value sold to traditional buyers and develop new markets. The Department of Export Promotion (DEP), THAI, DOA, exporting companies, and the Tourism Authority of Thailand have all responded by developing a wide range of promotional methods. The DEP's programs have been particularly effective.

8.2 Public-Private Sector Interactions

8.2.1 Department of Export Promotion (DEP)

A key interaction between the public and private sectors involves the Department of Export Promotion, importers from other countries, and Thai fresh fruit and vegetable exporters. DEP facilitates contact and communication between importers and exporters. DEP has offices in 13 countries throughout the world. DEP's efforts are funded through an internal trade promotion policy by which taxes levied on imported goods are used to support export promotion.

The DEP maintains a list of selected FFV exporters which is available to importers inquiring about Thai FFV. Exporters listed have a reputation for reliability. In the selection process, the exporters must provide a copy of the company's most recent balance sheet and a written account of its past experience. DEP also makes a personal inspection visit to the place of business.

As result of policy objectives in the Sixth Plan, DEP has listed target products for export which are prioritized based on the following criteria:

- Need for assistance in improving and promoting exports;
- Readiness of supply and availability of export management;
- High export potential in expanding markets;
- Need for further development and promotion; and
- Utilization of local raw materials as advantages for competition.

FFV were considered as target products of first priority for the fiscal year 1989. The main activities of the Department of Export Promotion to promote exports and develop the marketing system are discussed in the following sections.

Research on Production and Marketing Systems. The Department of Export Promotion recognized that information about demand, supply, and marketing are important factors in export enhancement and efficiency. As a consequence, the DEP employed private companies to collect market information. The research projects which have already been carried out are:

- Study on Utilization of Appropriate Technology for FFV for Export;
- Study on Production of FFV for Export; and
- Development of an Export System for FFV.

As part of a fourth project, information was gathered to improve a data collection system for the production of fresh fruits and vegetables. This was very beneficial in setting up an export promotion plan in line with domestic production.

In-Store Promotion. Fresh fruits and vegetables from Thailand were not well known in certain foreign markets, particularly in Europe, Japan, and North America. It was therefore necessary to organize in-store promotions to display the products and demonstrate methods of serving. The aim was to persuade consumers to taste Thai products. In foreign markets such as Hong Kong, Singapore, and Malaysia where Thai FFV were already popular, in-store promotions helped to increase sales. The Department of Export Promotion organized three types of in-store promotion:

- Promotion in collaboration with the department stores, with the help of Thai Trade Centers or Offices of Commercial Counsellors;
- Promotion with financial support from foreign organizations in the country where the promotion took place; and
- Direct collaboration with department stores and importers.

The DEP and DOAE feel they have been quite successful in introducing Thai FFV into the North American and European markets and understanding the requirements of the markets. They are taking the pragmatic view that export market development is usually a long term effort that seldom pays off quickly due to the many variables involved. The amounts and consumption patterns of FFV, including Asian immigrant buying, in these markets is unknown.

Trade Missions. External trade missions have been made to several countries. Usually, FFV were promoted in conjunction with other Thai products. However, special FFV missions were dispatched to Europe in 1988 and to Japan in 1989.

External study missions were also made to survey the markets, meet agencies concerned, study wholesale and retail systems, and study market demand. Collected data was used to improve the products and packaging in line with such demand. In 1989, a study mission was dispatched to three European countries: France, Federal Republic of Germany, and England.

At times, internal trade missions have been sponsored to host foreign importers and introduce them to Thai businessmen. One example is a study mission from the Netherlands which came to Thailand in mid-May 1989. An internal study mission also studied production systems and postharvest technology used by exporters and Thai farmers.

Internal press missions were also hosted for the media, including magazines, television news, and newspapers, to publicize Thai fresh fruits and vegetables in foreign markets. Among the media visitors were reporters of VAKBLAD and ETEN & DRINKEN Magazines from the Netherlands and the Television Board (BRT) from Belgium who came in June 1989 to produce a documentary film about tropical fruits in Thailand.

Publications and Media. In-store promotions, publications, and other media items help promote the sale of Thai FFV and also inform consumers about the types of Thai FFV available. Examples include the following:

- Nine high-quality photographic posters of rambutan, egg banana, mangosteen, mango, durian, longan, papaya, pomelo, and various kinds of beans;
- Mobile illustration basket of Thai fruits;
- Videos including "Fresh from Thailand" and "Thailand's Exotic Fruits." The former was dubbed into seven languages: English, French, German, Japanese, Chinese, Arabic, and Thai.

Training. In order to educate farmers and exporters about production, postharvest technology, and marketing, the Department of Export Promotion organized two types of training:

- Roundtable seminars with importers from abroad and Thai exporters. The latest seminar was with SFI from Sweden in May 1989;
- Training on production, postharvest technology, and packaging, both in Bangkok and up-country. One example was training on exporting mangoes to foreign markets held in Chachoengsao Province in April 1989.

8.2.2 Foreign Publications

In response to a large number of requests for information from exporters of fruit in tropical countries, the Export Market Development Division (EMD) in the United Kingdom produced a booklet entitled "Guidelines for Exporters of Avocados, Mangos, Pineapples, Papayas and Passion Fruit to the UK Market. This publication was prepared and financed by the Commonwealth Fund for Technical Cooperation and is the first in a series of EMD publications to provide exporters with information and guidelines for products entering the United Kingdom.

While not directed specifically to the Thai FFV export sector, the information is useful in establishing guidelines for Thai exporters. The booklet lists major wholesalers and importers as well as shops selling exotic fruit, including some of Britain's largest supermarket chains. It also includes practical examples, illustrating how the fruit should be packed so that it reaches its destination in peak condition. There are detailed descriptions of what fruit the market wants, how to transport it, where to send it and when to sell.

8.2.3 International Green Week

Thai exhibitors (including the DOA) have been represented at the International Green Week held in Berlin, Germany each February. Green Week, a global event for the food, agricultural, and horticultural industries, attracts representatives from both developed and developing countries and features presentations of the characteristic produce of participants' home countries. Green Week 1990 included some 1,000 exhibitors from 57 countries.

Thailand's participation in International Green Week 1990 was assisted by the German Agency for Technical Cooperation (GTZ). Thai FFV were represented with product displays and the serving of ethnic specialty foods. Thailand's booth focused on the Royal Project, displaying the range of vegetables grown under this project. Private sector products were also represented.

One of the difficulties experienced by Thailand each year is the fact that Green Week occurs just prior to the harvest season for many Thai FFV. Hence, a good representation of mature fruit is difficult to obtain for promotional purposes.

9. KEY INTERACTIONS AND LESSONS THAT CONTRIBUTED TO EXPORT EXPANSION

9.1 Key Interactions

Although many organizations and individuals have cooperated over the past decade or more, three main interactions have contributed most to expansion of Thai FFV exports.

Government Agencies with Specific Objectives of Serving the Private Sector. Of all the Thai Government agencies involved in the FFV industry, the DEP, TISTR, DOA, and DOAE have contributed the most. These agencies have oriented their policies to serve the private sector from farmer to exporter.

The DEP has worked most closely with exporters and foreign buyers to expand exports. This agency has been on the front lines of market development and acts as a major conduit of information between the Thai industry and foreign buyers. An agency similar to DEP could be established in most countries that are interested in increasing FFV exports.

TISTR's Packaging Center and Research Service Center also serve the private sector and have had a large impact in helping private exporters solve specific packaging, processing, and other technical problems. TISTR's mandate is to develop and transfer technology to the Thai private sector. It also interacts with international organizations to access and adapt this technology. Like DEP, an agency similar to TISTR could be established in many countries.

Agencies like DOA and DOAE are perhaps more common than DEP and TISTR. Most countries have research and extension branches as vital components of their agricultural ministries. However, the Thai DOA and DOAE have been particularly active in serving producers, processors, and exporters of FFV. The same emphasis could be placed on their counterpart agencies in other countries.

Interministry Project. Another key interaction, according to Thai agricultural officials, is the Interministry Project. While communications and coordination can still be improved, the Interministry Project has made great strides in bringing together key MOAC departments and other Thai Government agencies with a common goal of improving the FFV industry. This project was created as part of the national agricultural policy. A similar project established in other countries could possibly have equal or better results.

Thai Airways FFV Air Cargo Policy. The Government Order Regulation on FFV air cargo rates and THAI's policy giving preferential cargo space to FFV have encouraged and maintained exports. Without this combination of government regulation and the cooperation of a state-owned and operated airline, it is doubtful that export growth would have achieved current levels. THAI's plans to build airport cold storage facilities is a sign of its continued support of the industry. Similar government regulations and cooperation by state-owned airlines could be established in other countries.

9.2 Lessons Learned

Specific lessons can be learned from some of the interactions described in this report, some of which are examined in more detail below.

Training and Research. As was pointed out above in discussing the Interministry Project, cooperation between various departments in the Ministry of Agriculture, TISTR, and other Government agencies has had a positive impact on training and research. This project, in combination with objectives set by the individual agencies to assist the private sector, has served as a "blueprint" to establish closer ties between government and private business. Private companies and farmers have gained by accessing higher quality research and training resources than they could have supported on their own. Through these interactions, Government agencies have gained better insights into the needs of the industry and have adjusted their research and training to meet these needs. Seminars, technical consultants, trial shipments, and other applied research methods have been important tools in transforming the blueprint into reality.

Despite the many positive interactions noted, Government agencies often compete more than they cooperate. The tendency to promote self interests is inevitable, but it is an issue that bears constant attention in the Thai government if the various departments expect to maintain their hard-earned credibility.

Production. The main lesson learned from examining production-related interactions is that increased investments by exporters, which are often facilitated by government agencies, are important elements in upgrading the FFV industry as a whole. This underlies a more important lesson, which is that the private sector has been an effective agent of change throughout the production and marketing system. Changes have been most effective when Government agencies have facilitated these investments. DOAE and BAAC efforts to support farmer groups that are working with exporters are good examples.

Discussion of these efforts to support farmer groups leads to another lesson, which is that in a predominantly small farmer-based production system such as Thailand, exporters usually cannot work with individual small farmers and remain competitive in the marketplace. Consequently, exporters need to work with groups of farmers rather than individuals. They also need help to establish and maintain relationships with these groups, mainly to transfer the information and technology to meet the needs of the market. Often, local government officials can be most effective by assuming these dual roles of "translator" and "transfer agent."

While contract farming is not important in the whole FFV export picture, it is becoming more important in some commodities such as asparagus and other annual crops. It seems to be emerging in many commodities as a viable means to integrate the needs of producers, particularly those who have few resources and are averse to risk, with those of exporters. It appears to be reducing producer price risk, offering inputs that may not otherwise be used (finance, production inputs, and management assistance, etc.) and improving

quality through closer integration of production with markets. While it is not yet a major factor in export growth, it has contributed to the expansion and is playing a more important role all the time.

The Royal Project offers lessons on the impacts of a highly visible national project on several segments of the FFV industry. The objectives of the project are to eliminate opium production and offer alternative crops to farmers. The project has certainly been successful in this respect, and FFV production has increased considerably. The project's high visibility due to the royal sponsorship have led to other benefits including more research efforts, greater investments in packing and transportation methods, and promotions in tourist sites and major hotels in Bangkok. It may be difficult to duplicate these efforts elsewhere, but valuable lessons can be learned.

Packing and Processing. Several valuable lessons relating to packing and processing research by DOA, TISTR, and others have been discussed above. However, the case of mango shipments to Japan offers additional lessons in transforming a product to meet market needs. The first lesson is that direct contact between local suppliers and end users is essential. The efforts of an influential producer, assisted by Thai and Japanese officials, to contact Japanese buyers was the first step in developing this market. The relationships that developed from this step encouraged the Japanese to look closer at the Thai mango industry and led them to provide the needed VHT equipment for fruit fly control. Despite the skepticism among some members of the industry about whether this technology is being used to benefit the industry or just a few private interests, Thai mango exports to Japan have grown.

Another lesson to be learned from observing the industry in its present state, which is less obvious but just as important, is that relatively simple, low-cost technology and efforts may be enough to markedly improve quality. Len Wooten, a consultant to DOAE, pointed out the importance of simple, thatch-roofed sorting and packing sheds located close to growers, which served not only as processing centers, but also as places for farmers to meet and exchange ideas among themselves and with DOAE and exporter agents.

Quality Control. Efforts to control quality provide several valuable lessons. The first is that inspection facilities must be located in sufficient numbers and locations to serve the needs of the shippers and buyers, not the Government agencies which operate the facilities. The transfer of the Bangkhen facility to the airport at the urging of exporters was a relatively simple, low-cost Government effort to serve the private sector better.

Cold Storage. Efforts to supply adequate and well-operated cold storage facilities at the airport have been slower to emerge but they are developing. This may be because the larger, more influential exporters have their own cool storage facilities and therefore lack a vested interest in these improvements.

Both these efforts again point to the need for Government agencies to serve as facilitator for the private sector.

The key lesson in HRI and other efforts to establish grades and standards is that it is extremely difficult to transform a system which is based on traditional marketing practices and concepts of quality. Even in most domestic markets today, Thai sellers and buyers assume that a given lot of produce will contain a range of quality. The idea of separating premium quality produce to satisfy a very particular export market is still relatively new, particularly in the minds of most farmers. Efforts to establish grades and standards must be implemented gradually and allow for the improvement of quality as the industry evolves.

Transportation. Government actions to influence airfreight rates have had a positive impact on exports. In fact, without this influence, the industry would probably not exist as it does today. One important question, however, concerns the impact on other products suitable for airfreight. Also, how much have Government and THAI FFV air cargo policies limited research and development of seafreight transportation? Perhaps the short-term policies and export gains are distorting the reality of the market and are unsustainable given significant subsidization. This reliance on airfreight could very negatively affect exports as fuel costs increase.

Efforts to develop seafreight methods show that this mode of transportation holds promise, particularly in the large and less quality-demanding "back yard" (regional) markets in Asia. As the Denmark test shipment showed, however, it may be difficult to obtain the larger quantities of high quality produce if this transportation mode is developed to its potential.

Promotion. As highlighted above, DEP's efforts to promote Thai FFV internationally have been a key element in building exports. These efforts again point to the need for the Government to facilitate the private sector's efforts. In examining DEP's programs more closely, some important lessons emerge. The first is that a comprehensive range of activities is necessary for a Government agency such as DEP to support the export business. Clear objectives on the types of products to promote and the markets to target can be set only by careful research. Often, outside support is needed to do this research. Actual promotional activities target specific markets, but cooperation with diverse groups is usually needed for these efforts to succeed. Some felt that promotions in Europe or North America were less cost-effective than more efforts to develop Asian markets.

10. FUTURE DEVELOPMENT

10.1 Projections

It is likely that Thailand's fresh fruit and vegetable exports will continue to grow steadily and could increase dramatically in some commodities. Several factors support this conclusion.

Foreign Capital. The rapid rate of economic development in Thailand is fueled mainly by foreign investment. Thai companies are following this lead and reinvesting. Low labor and production costs, combined with an abundance of natural resources, are the main attractions to both foreign and Thai investors. This influx of capital brings more technology and expertise, as well as spotlights the advantages of operating in Thailand. Foreign investment policies are heavily oriented to stimulating exports. These and other macroeconomic factors are likely to favorably affect the FFV industry.

Investments in Technology and Market Development. The development of the FFV export industry has been steady, with many public and private resources committed to it. These investments in technology and market development are now showing returns, which are likely to continue, along with the commitment of researchers and marketers to improving the industry. Expansion plans for airport cold storage facilities, ongoing research with new types of postharvest treatment, promotions, and educational seminars are all aimed at marketing higher quality products in export markets. While production is likely to grow moderately, the overall quality of the product is likely to improve, thus providing more produce suitable for export markets and continuing to draw more traders into the business. In short, current successes will be multiplied in the future.

Increasing Demand. An increasing tourism industry, immigration of Asians to other countries, and continued promotion by public and private Thai organizations will stimulate foreign demand. Increasing purchasing power of Thai consumers is likely to draw some high quality produce away from export markets, but this volume is likely to be small in relation to foreign demand. While many of the 55 million Thais are gaining from the current economic boom, the vast majority still reside in rural areas and earn low incomes. Consequently, domestic consumers are likely to buy lower quality and lower priced FFV. Higher profit margins for merchants in export versus domestic markets will ensure that most top quality produce moves to international markets before being sold locally.

10.2 Constraints to Expanded Exports

Problems and constraints to expanding FFV exports in the future include the following:

Adequate and consistently available products to meet market demand. The seasonal nature of FFV production, combined with annual fluctuations in supply due to weather, makes it difficult for many private firms to survive solely on this business. The proportion of the total crop suitable for

export is also still relatively small. Growing competition from other countries to supply unfilled market niches adds to the difficulties.

Inadequate airfreight capacity and airport handling facilities. The lack of adequate airfreight space and cold storage facilities could potentially constrain increases in exports beyond present levels. Losses at the airport resulting from present facilities and procedures are high. Although more cold storage is being added, there are still problems with standard handling and loading procedures. Many of these are not easily solved, particularly as airport facilities are used more heavily each year as a result of Thailand's rapid economic growth.

Greater profitability of other products competing for air cargo space. The Government Order Regulations, combined with THAI's policies favoring FFV in relation to other cargo, is a major stimulus to exports. It is unlikely these policies will change soon, but if they do, the impacts on the FFV industry could be severe. As export volumes increase, THAI's capacities will be strained, which could add to present difficulties. Entry of new air cargo carriers into Thailand should help to offset these constraints, but these carriers are likely to favor higher margin, lower risk cargo over FFV.

Export regulations in foreign markets. The difficulties of meeting the strict health and sanitary requirements of foreign markets, particularly in developed countries, will continue to limit Thai exporter's abilities to tap large and lucrative markets. New technologies in controlling fruit fly and seed maggot are being developed, but are still not widespread among producers and shippers.

Insufficient cooperation between industry members. The public and private sectors have cooperated well to develop exports. However, communication and coordination are still insufficient, particularly in the public sector. Shippers complain that too much time is required to contend with red tape and that obtaining information and services is too difficult. Corruption among some government officials is also a problem.

11. CONCLUSIONS AND SUGGESTIONS

This study clearly shows that Thailand's export successes result from years of devoted efforts by many people. A market-oriented approach consistently shines through in these efforts. Also of note is that government policy and planning have been realistic in relation to the capabilities and needs of the industry as it developed. These realistic policies have served as accurate blueprints in public sector cooperation with private businesses in building an export industry. Of great importance are the actions of the Thai Government to create agencies that directly serve the industry. Most importantly, these agencies have actually assisted the industry, not just provided a token effort as so often happens. The result of these and many other efforts is an industry that can compete and is poised to be a future leader in world markets.

The following recommendations are respectfully offered as ways to improve and refine the industry:

- **Continue the successful methods of cooperation and communication.**

  The Interministry Project and Department of Export Promotions are excellent examples of successful programs. The cooperation of TISTR, DOA, and DOAE with private businesses and farmers is equally commendable and should be continued.

- **Give more attention to the producer end of the marketing channel.**

  Statistics show that production of most FFV has not increased much in the past decade. At the same time, export markets have taken increasing volumes of the steady supply. This points to the need to expand production for the future and improve quality for international sales. Low prices to farmers appears to be the major factor limiting increased production, though farmer risk aversion is also a factor. Mutual mistrust between farmers and middlemen continues to be a problem. It has not been possible to determine to what extent low prices may be due to competition among farmers as opposed to collusion on prices among middlemen. It is clear, however, that there is a need to offer small-scale, low income farmers better returns for their efforts and a more equitable share of Thailand's successes.

- **Work to improve transportation and handling systems.**

  Losses between the farm and point of export are high. Often these could be reduced through simple changes in procedures and more responsibility taken by product handlers throughout the marketing chain. More efforts should be given to shipping by seafreight rather than air, which would greatly reduce prices, result in increased demand, and relieve the industry's dependence on costly and sometimes overburdened airfreight.

- **Concentrate on fully developing Asian and other regional markets.**

  Markets right in Thailand's back door are large and growing. They also do not have the strict quality control requirements which Western and Japanese markets do. Perhaps more important is the fact that Thailand

is more likely to be consistently competitive in Asian markets. If freight rates to Europe or North America rise in the future, or strong competition emerges from other worldwide competitors, Thailand is not likely to maintain a large share of these markets.

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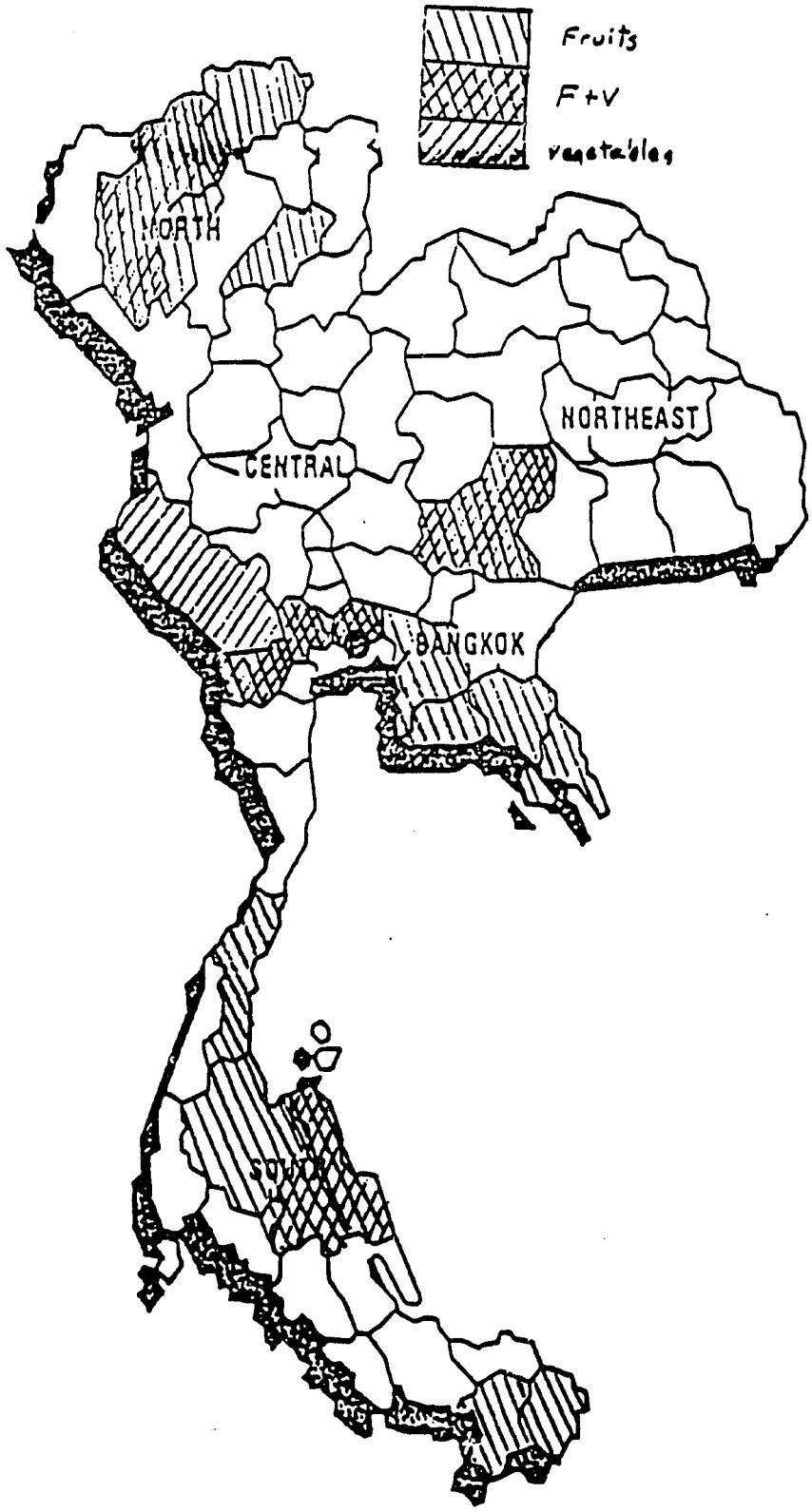
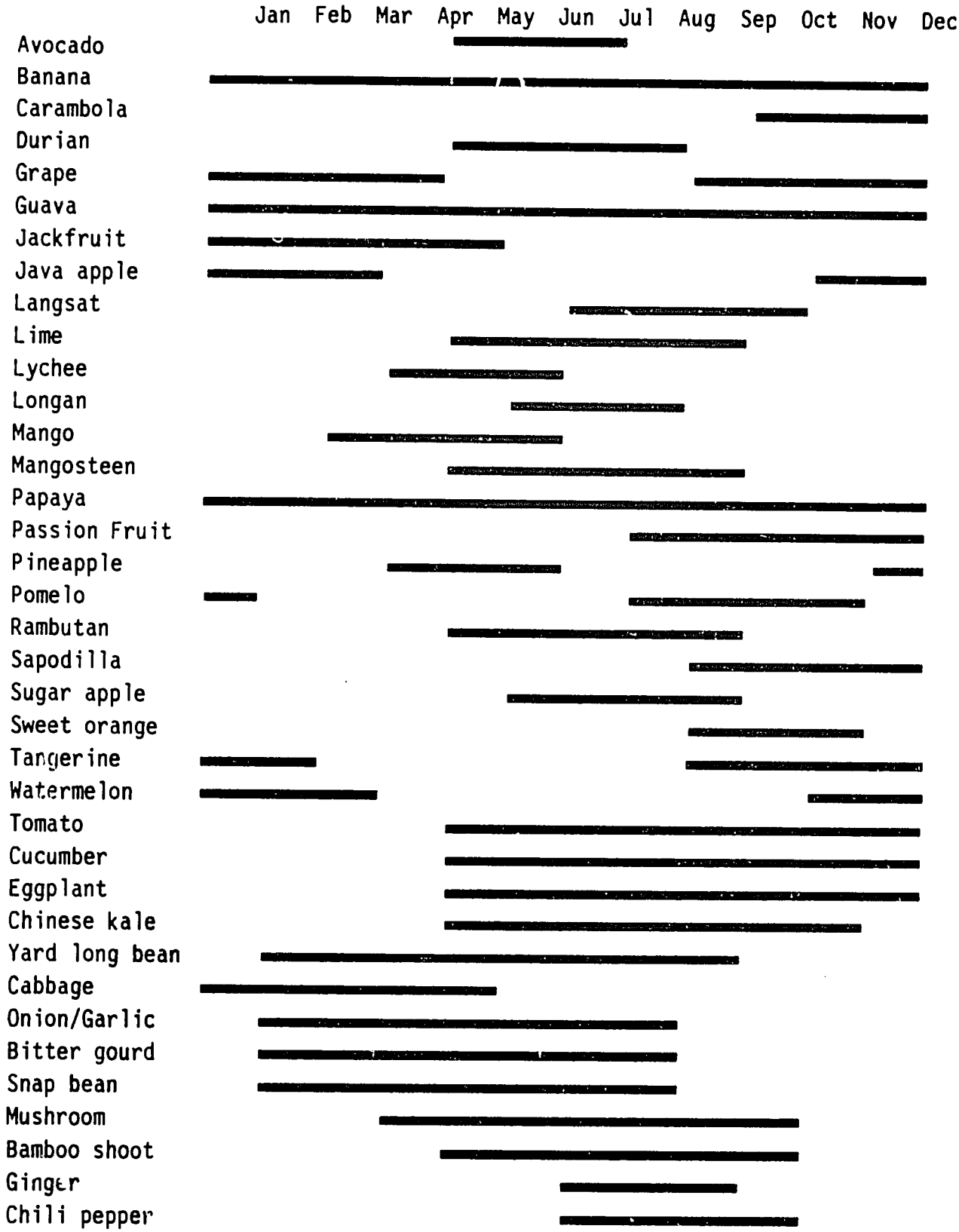
APPENDIX A

MAP OF THAILAND



APPENDIX B

PEAK HARVEST SEASONS OF FRESH FRUITS AND VEGETABLES



APPENDIX C

PUBLIC AND PRIVATE SECTOR FRUIT AND VEGETABLE CONTACTS

Public Sector

Bank for Agriculture and Agricultural Cooperatives
460 Nakhon Sewan Road
Bangkok, 1033
Tel: 280-0180

Food and Agriculture Organization
39 Pra-Athit Road
Bangkok
Tel: 281-7873

Department of Export Promotion
22/77 Rachadapisek Road
Bangkhen Bangkok, 10900
Tel: 511-5066-77

Royal Project
Marketting Section (Bangkok)
Kasetsart University
Bangkhen Bangkok, 10900
Tel: 579-1175, 579-5142, 579-3574

Thailand Institute of Science and Technology Research
Attn: Sing Ching Tongdee
196 Phahon Yothin Road
Bangkhen Bangkok, 10900
Tel: 579-1121-30

USAID
37 Soi Somprasong 3
Petchburi Road
Bangkok 10400
Tel: 252-8191, 5903

Department of Agriculture
Attn: Dara Buangsuwon
PPMD Dept.
Bangkhen Bangkok, 10900
Tel: 579-4127

Department of Agriculture Extension
2143/1 Phahon Yothin Road
Bangkhen, Bangkok, 10900
Tel: 579-0212-8

Ministry of Agriculture and Cooperatives
Ag. Technology Transfer Projects
Attn: Dr. Robert Ralston
Rajadamnern Ave., Bangkok
Tel: 281-5955 ext. 228

Thai Airways International Lt.
Attn: Somphob Wathanapong
Bangkok Airport
Cargo Terminal
Tel: 523-6121 ext. 251

Private Sector

A.T.E. Maskati Ltd.
78 Anuwong Road,
P.O. Box 116
Bangkok, 10100
Tel: 222-3176-80

Boonrat Pokapand Ltd., Part.
(Eastern Green-Freezing Foods Co., Ltd.)
152 Chakrapetch Road., Pakklong Talad
Bangkok, 10200
Tel: 221-5022, 221-8367

Chain Air Services Co., Ltd.
61/5 Aree Townhouse Sukhumvit Soi 26
Bangkok, 10110
Tel: 258-6549

Deja International Marketing Co., Ltd.
73 Chakrapetch Road
Bangkok, 10200
Tel: 222-4412, 223-6045

E.A.C. Export Corporation Ltd.
539 Worachak Rd.,
Bangkok, 10100
Tel: 221-8161-5

First World Import & Export Co., Ltd.
12th Floor, Thai Wah Tower
21 South Sathorn Rd., Yannawa
Bangkok, 10120
Tel: 240-9156-8, 240-9160-1

Grand Asia Incorporation Ltd.
1759/57-59 Pinklao-Nakhonchaisri Rd.,
Bangbamru, Bangkok, 10700
Tel: 424-6993, 424-3051

Jubilee International
139/5 Wireless Road.,
Bangkok, 10500
Tel: 252-1270

Bangkok Trading and Export
59 Mahannop Road, Saochingcha
Bangkok, 10200
Tel: 224-1081, 424-2979

Chada-In-Gasser Ltd.
100/37 Ladprao So
Bangkapi, Bangkok, 10310
Tel: 538-1698

C.P. Group
Ag & Ind Devel.
Tel 231-0231

Dr. Prapat Sitdhisung
186 Maejo Sunsai
Chiang Mai, 50290
Tel: (053) 248-439

Eastern Fruit Co., Ltd.
386/33 Soi Chalormsuk Phahonyothin Rd.,
Bangkhen, Bangkok, 10990
Tel: 258-3642

Fruitful Ltd., Part.
17/2-4 Soi Pradit, Surawong Rd.,
Bangkok, 10500
Tel: 234-5609, 233-2012

I.V. Pong Supply Ltd., Part.
199/27-28 Viphavadi-Rangsit Road
Samsennai, Phayathai
Bangkok, 10400
Tel: 279-3241, 279-9947

Kaset (1978) Co., Ltd.
846-848 Songwad Rd.,
Samphanthawong, Bangkok, 10100
Tel: 223-3618-20

Kijtavee Chai Export LP.
713/4 Sathupradit Road, Bangpongpang,
Yannawa, Bangkok, 10120
Tel: 284-0721

Krating Ltd., Part.
210 Krung Kasem Road.,
Teled Wang Maharaj, Bangkok 10100
Tel: 282-9358, 281-1963

O.P.I.C. Commercial Ltd., Part.
815 Soi Sirinthep Pattanakarn Road
Bangkok, 10250
Tel: 321-4407

P.K. Import Export & Air Cargo Co., Ltd.
3 Soi Archara, Suthisan Road
Bangkok, 10310
Tel: 277-3062

Fisitichai International Co., Ltd.
197/4 Suriwongse Road
Bangkok, 10500
Tel: 233-2012, 233-0525, 235-9038

Polydor Co., Ltd.
253 Sukhumvit Road, Phrakanong
Bangkok, 10110
Tel: 251-3088, 251-3839

S.G.S. Thailand
Food Division
994 Soi Thonglor Sukhumvit Road
Bangkok, 10110
Tel: 392-1066

Siam Wings Co., Ltd.
173-173/1-3 Surawong Road
Bangrak, Bongkok
10500
Tel: 233-9480-5

Klong Siam
355/145 Phahonyotmin
Lum Lukaa, Prathumtam
Tel: 531-50559

N and N Mercantile Ltd.
652 Tak Sin Road, Thenturi
Bangkok, 1000
Tel: 465-0591

Oscar Intertrade Co., Ltd.
342-344 Bamrungmaung Rd.
Bangkok, 10100
Tel: 223-4354, 223-0630

Phol Intergrower Co., Ltd.
715 moo Ban Rachada Niveej
Pracha uthit Road, Huay Kwang
Bangkok, 10310
Tel: 277-5151

P. Prime Co., Ltd.
119-51 Pathumwon
Bangkok 10500
Tel: 252-2588, 252-6249

Ptt Intertrade Ltd., Part.
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New Road, 63, Yannawa
Bangkok, 10120
Tel: 212-4003, 212-4005

Siam Canadian Trading Co.
10/2 Sukhumvit Soi 27
Bangkok, 10110
Tel: 258-2578

S & L Commercial Co., Ltd.
59/3 Satupradid Road
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Tel: 211-8107

Tang Han Kee Ltd., Part
251-11 Rama 4 Road
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Thai Agriculture Products Co., Ltd.
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Bangrak, Bangkok, 10500
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T.M.T. Systems
12A Chokchai, 690 Sukhumvit
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Vigor Trading Ltd., Part.
39/9 Soi Anuman Rajchathon
Surawong Road, Bangkok 10500
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Taled Fresh Co. Ltd.
10 Soonthornkee Road
Bangkok, 10110
Tel: 249-0491

Thai Global Food Co. Ltd.
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Bangkok, 10110
Tel: 249-3431

Veda Marine Co., Ltd.
Sixth Floor, Udomvitthaya Building
956 Rama 4 Road., Bangkok, 10500
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Wanthakarn Co., Ltd.
696/1 Soi Wat Rajbuakhao
Charoen Krung Road, Yannawa
Bangkok, 10120
Tel: 289-0246, 289-0257, 289-0281
Bangkok, 10500